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MAFF
ANIMAL HEALTH AND WELFARE RESEARCH REQUIREMENTS DOCUMENT

1999-2000

MARCH 1998

Ministry of Agriculture, Fisheries and Food

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CORRECTION

Page 14, paragraph 53. Replace " in late June early July" with "in May".

Page 34. Please insert between paragraph "B" and "Further Information" the following:

"The programmes concerned with the on-farm welfare of pigs and welfare at slaughter are currently under review. Guidance on future requirements, including projects to start in 1999/2001 will be issued in due course".

Pages 32, 33, 37. The following **Animal Welfare** contact details should read:

Mr Edward Varley Tel: 0181 330 8118

Mr Mike Lomas Tel: 0181 330 8790
e-mail: m.j.lomas@ahws.maff.go.uk

Foreword from the Chief Scientist

I am pleased to launch the first edition of the Ministry of Agriculture, Fisheries and Food, (MAFF) Animal Health Research Requirements for the financial year 1999/2000. The research is funded on behalf of the Animal Health (Disease Control) Division, the Animal Welfare Division and the Chief Veterinary Officer's Group in the Animal Health Veterinary Group.

This year the document includes the requirements in the areas of tuberculosis, food-borne zoonoses, non-food-borne zoonoses and animal welfare. Applied strategic research covers original research to gain new knowledge which is directed towards long term policy aims. Applied specific research tends to be short term and focused on a closely defined issue or problem. Both areas are funded from the same research budget.

MAFF has a substantial commitment to research on BSE and related diseases, the requirements of this programme are, however, not detailed in this document. The programme has to be responsive to research needs as they are identified by the Spongiform Encephalopathy Advisory Committee (SEAC) and other expert groups as well as the policy needs of this and other Departments. It is therefore managed to permit this flexibility of response. In addition to commissioning research to meet these needs, MAFF has an open door policy to other research proposals in this area and the programme is co-ordinated with programmes of other government funders and the European Commission.

The recent publication of the Krebs Report on Bovine Tuberculosis in Cattle and Badgers has resulted in a change in direction for TB research. In addition, the emergence of *E. coli* O157:H7, as a food pathogen, has resulted in a shift of priorities in the food-borne zoonoses research programme. However, it should be realised that not all aspects of these issues will be represented in the Document this year as relevant ongoing research programmes may already be in place (Annex IIIa). In addition, the Document does not cover the research programmes on exotic and endemic diseases, veterinary medicines and some welfare programmes (Annex IIIb). It is anticipated that these will be included in future years.

As well as the complete list of requirements and list of current projects, there is a comprehensive section on how to make applications to MAFF for funding, which accompanies a copy of the application form and financial guidance notes on estimating project cost (Annex II).

The section on selection criteria provides clarification of the assessment procedures that will be used to determine which proposals will be supported. This section also includes the proposed timetables for the assessment procedures and indicates when applicants may expect to ascertain whether they have been successful in securing MAFF funding.

For reference, all acronyms or abbreviations used in the text are detailed at Annex I.

I hope that you will welcome these changes to the way in which animal health research is placed by MAFF which forms part of our ongoing commitment to improve our service to

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potential contractors and interested organisations.

We would welcome any feedback which you may wish to give on the Requirements Document, in relation to the content, format or ease of use. All comments should be sent to: Mr Andrew Salisbury, Room 664, St Christopher House, 80-112 Southwark Street, London, SE1 OUD.

Dr D W F Shannon
Chief Scientist

Animal Health and Welfare Research Requirements 1999-2000

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BACKGROUND

1. MAFF funds research to investigate specific problems, to develop policy options, implement solutions and to assess their effectiveness. Research may be supported where policy changes require new knowledge. This research contributes to the strategic aims of the Ministry which are to:

- Protect the public.
- Protect and enhance the rural and marine environment.
- Improve the economic performance of the agriculture, fishing and food industries.
- Protect the welfare of farm animals.

2. Further information on the aims and objectives of MAFF is available in the MAFF/IB Departmental Report 1997 (MAFF Publications, Admail 6000, London, SW1A 2XX, Telephone: 0645 335577).

3. The research requirements for the Animal Health and Veterinary Group (AHVG) of MAFF are defined according to Research Programmes whose rationales have been published in the MAFF Research Strategy Document 1996-2000. This document sets out the relationship between MAFF policy and its supporting research programmes. It identifies how research needs can be addressed and how industry, academia and research organisations can contribute. Copies are available from MAFF Publications, London, SE99 7TP.

4. The work carried out under the MAFF Animal Health Research Programme supports the Ministry's strategic aims to improve the microbiological safety of food, to protect the health of those with direct contact with farm livestock, to protect farm animals and to maintain our freedom from exotic disease.

5. The Ministry needs to maintain a nucleus of expertise and facilities at a number of commissioned institutions to enable the rapid and accurate diagnosis of disease in animals and to provide consultancy advice in support of control policies. This enables MAFF to meet its statutory, European Union (EU) and other obligations. Consequently, some research will continue to be placed with existing contractors and will not be offered for open competition.

6. For research to achieve its purpose, the results must be effectively transferred to the user. Within the Ministry, this is facilitated by the direct contribution of research to the formulation and implementation of the AHVG policy. Many of the research requirements identified in this document concern longer term applied strategic research needs for animal disease research that are expected to influence policy at some point in the future. Applied specific research is intended to meet specific, short term and well defined research needs, and comprises a significant component of the Animal Welfare programme.

GUIDANCE FOR APPLICANTS

7. This Research Requirement Document is available on the MAFF Website at:

http://www.maff.gov.uk/r&d/summary/animalh.htm

GENERAL

8. To apply for MAFF funding for the financial year 1999/2000, potential contractors are requested to submit **eight** copies of the following in support of **each** research proposal:

i. A completed standard application form, CSG 7 (Revised: 3/97).
ii. A one page executive summary of the proposal.

9. **Electronic versions of the CSG 7 form are available and applicants are strongly encouraged to use this format. If the electronic version of the CSG 7 is used please submit both the disc/E-mail and eight hard copies. Copies of the electronic version of the form can be obtained using the E-mail auto reply service as explained below:**

USE OF THE E-MAIL AUTO-REPLY FACILITY

10. The E-mail auto-reply system allows a document to be sent, via E-mail, in response to a request which has been received, also via E-mail. The response is totally automatic and simply requires the person requesting the information to send an E-mail (with no text) to:

help-csg@auto-reply.maff.gov.uk

11. In the subject/title box the sender must enter the name (Keyword) of the document that they wish to receive. If you are unsure of the name of the document, then the subject box can be left blank and you will receive an index. The index lists the documents available and a brief description of their contents. At present, the index looks something like this:

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AUTO-REPLY: THE MAFF400 ON-LINE INFORMATION RETRIEVAL SYSTEM
****

12. To use this system please send a message (with no text) using the appropriate KEYWORD as the subject/title to help-csg@auto-reply.maff.gov.uk

Keyword	Publication Name
csg7.dot	Application for a Research Contract with MAFF
csg7a.dot	Annex A (*Curriculum Vitae*) & Annex B (Bibliography)
csg7inst.doc	Instructions for installation and use of CSG7 and CSG7a templates
csg12.dot	Annual/Interim Project Report template
csg13.dot	Final Project Report template
12_13inst.doc	Instructions for installation of the CSG12 and CSG13 templates
repguide.doc	Guidance notes for completion of the CSG13 form

GUIDANCE ON INSTALLATION OF CSG7 AND CSG7a TEMPLATES

13. It is **IMPORTANT** that you copy CSG 7.dot to the C drive template folder.

14. To use, choose **NEW** from the word menu. The document will open as an untitled document.

GUIDANCE ON USE OF CSG7 AND CSG7a TEMPLATES

15. Make sure you are looking at the template in **'PAGE LAYOUT'** view. To help you complete the form, instructions are printed in **RED** or **BLUE** at various stages throughout the form and have been programmed not to print. If you are unable to see these instructions, please carry out the following steps:

- Go to the **TOOLS** menu and click **OPTIONS.**
- Make sure you are in the **VIEW** folder. Under the column headed **'NON-PRINTING CHARACTERS'**, the box **'HIDDEN TEXT'** should be checked (**X**).

You can move through the fields by using the **RETURN, TAB** or **DOWN ARROW unless directed otherwise**. Protected fields are identified by **GREY SHADING** in the boxes. You will not be able to **SPELL CHECK** these fields or change the size and style of type.

16. So that the template will work correctly, please follow the instructions given on the form. Some questions will allow you to enter as much text as necessary and use the **SPELL CHECK**. If you wish to use the **TAB** key in any of these free text areas, hold down the **CONTROL** key and press **TAB.**

17. In the event of difficulty please contact:

Mr Andrew Salisbury, Telephone: 0171 921 3926

18. A copy of the standard application form and notes on its completion are located at Annex II. Applicants must clearly identify which paragraph(s) of the Research Requirements Document their proposal addresses in Section 5(a). Details of the cost and time-scale of the project must be given. Proposed start dates for research should be no later than 1 January 2000. Financial guidelines for project cost estimates are contained in Section 3 of the form. Forms should be submitted as typed or word processed documents. Please **do not** exceed 120 characters in the project title.

19. **Potential contractors should note that failure to include an executive summary will mean that it will not be possible to process the application.**

20. All proposals submitted should fall within the scientific objectives of one or more of the programmes listed in this document. Potential contractors must detail the scientific objectives of the project and the experimental approaches envisaged. They must also indicate on the application form which requirement(s) in this document their proposal relates to. In

the case of joint applications, each individual laboratory should submit a separate application form that details those aspects of the project it will be carrying out and which clearly indicates on the application form that it is part of a joint application. Each section of this document provides details of a contact person for each programme and potential applicants are **strongly encouraged** to contact the person identified with any questions they may have concerning the programme and to discuss their proposals.

21. All proposals should be submitted to:

Mr Andrew Salisbury
Ministry of Agriculture, Fisheries and Food
Room 664, St. Christopher House
80-112 Southwark Street
London
SE1 0UD
Telephone: 0171 921 3926

ALL APPLICATIONS MUST BE RECEIVED BY 3 JULY 1998. WE REGRET THAT APPLICATIONS, IN WHATEVER MEDIUM INCLUDING FAX OR E-MAIL, THAT ARE RECEIVED AFTER THIS DATE, WILL NOT BE CONSIDERED.

SELECTION CRITERIA (STRATEGIC)

22. **All research proposals for applied strategic research, whether placed by open competition or by commission, will be critically evaluated by the Chief Scientist's Group (CSG), the Policy Group, (AHVG), and independent appraisal panels, which will include acknowledged experts in the relevant field**. Each proposal will be carefully judged against all the following criteria:

- Relevance to the policy customers' requirements.
- Overall scientific quality.
- Value-for-money.
- Support of a potential industrial partner or user where research has the potential to, or is intended to, lead to a technological development.
- Whether the approach proposed is the most feasible.
- Likelihood of achieving the stated objectives within the proposed time frame.
- Research not already supported elsewhere.
- Research that develops or maintains expertise for policy.

23. In addition, for much of the work it will be important to demonstrate that there is **collaboration between scientists covering the multi-disciplinary skills** which are frequently necessary to achieve effective advances. The types of collaboration necessary often cross the traditional boundaries of Research Councils, University Departments and Government Agencies and may need to involve research groups abroad.

24. The timetable for the 1999/2000 funding round is set out in Section 29. After the closing date for applications (3 July 1998), the proposals will be distributed to the AHVG and

the independent experts. At the start of the appraisal process, the CSG and AHVG will conduct an initial sift of all the applications received, to determine whether there are any applications which do not meet the policy objectives or research requirements stipulated. Such applications will be rejected at this stage.

25. From 3 July onwards, appraisals of each application will be carried out by the CSG, AHVG and the independent assessors. During September, appraisal panels will be convened for each of the research programmes, to assess and rank the scientific quality of the proposals submitted. Decisions on which projects to fund will normally be taken in October by CSG and AHVG. At this stage, some projects may be placed on a reserve list as 'acceptable for funding' if resources are available. Final decisions on these projects will be reached early in 1999.

26. By the end of October 1998, all potential contractors will have been informed of the outcome of the assessment procedure. Applications will either have been:

- Accepted in principle for funding, in which case post-tender negotiations may be required before a contract can be prepared.
- Placed on a reserve list pending the finalisation of the Ministry's research budget.
- Rejected.

27. Contractors will be informed why a proposal could not be supported, but it must be appreciated that limited resources preclude detailed discussions on the reasons for rejection.

SELECTION CRITERIA (APPLIED)

28. The selection criteria set out in Sections 22-27 will also be used to assess proposals for shorter term applied specific research projects.

TIMETABLE

29. The timescale below sets out the latest dates for completion of the actions indicated.

Date	**Action**
3 July '98	Closing date for applications.
10 July '98	Proposals distributed to AHVG and independent external experts.
10 July '98	Acknowledgement of receipt sent to applicants.
August '98	Receipt of appraisals from CSG, AHVG and independent external experts.
September '98	Meeting of Appraisal Panels to discuss scientific merit of research proposals.
October '98	Meetings between CSG and AHVG to agree proposals to be accepted for funding and to be placed on a reserve list.
31 October '98	All applicants informed of the outcome of the appraisal of their research proposals.

MONITORING OF RESEARCH PROGRESS

30. All research projects commissioned by MAFF are monitored according to the milestones and key measures of achievement laid down in the Contract or Memorandum of Understanding for commissioned projects.

31. The current portfolio of projects in the MAFF animal health and welfare research programmes is provided at Annex III.

INTELLECTUAL PROPERTY RIGHTS

32. MAFF's policy is to promote effective transfer of new technology arising from MAFF funded research.

33. To achieve this aim, the ownership of IP arising from the work which MAFF funds will vest in MAFF but contractors are encouraged to take the lead in the commercial exploitation of this IP. All royalties arising from commercial exploitation of MAFF owned IP are split between MAFF and the contractor usually on a 60:40 basis.

34. Where core MAFF pays for R & D carried out by our Agencies, the responsibility for IP management normally rests with the Agencies although the ownership rests with MAFF. The Agencies have progressively been taking up this responsibility since 1997 and our formal agreements with them from 1 April 1998 will reflect these changes.

35. Under the Government wide LINK schemes, where there is a high proportion of industry funding in cash (or in kind), our policy is to leave IP ownership with one or more of the collaborators.

EUROPEAN COMMUNITY FRAMEWORK PROGRAMME V (1998-2003)

36. Framework Programme IV which included the FAIR Programme comes to an end in 1998. There will be no further calls for proposals in this Programme.

37. A common position has been reached on Framework Programme V which contains four thematic research programmes. Theme 1 entitled **'Improving the quality of life and management of living resources'** contains the following Key Actions from which specific programmes will be elaborated:

- Food, Nutrition and Health.
- Control of Infectious Diseases.
- The 'Cell Factory'.
- Environment and Health.
- Sustainable Agriculture, Fisheries and Forestry, including Integrated Development and Rural Areas.
- The Ageing Population.

38. The aim of the 'Food, Nutrition and Health' key action is to promote the development of knowledge, technologies and methods, including prenormative aspects, based on multidisciplinary approaches to produce a safe, healthy, balanced and varied food supply for

consumers that covers the whole food chain. Priority areas for research have been identified as:

- The development of safe, flexible and new/improved manufacturing technologies to improve food quality and consumer acceptability, while guaranteeing traceability of raw materials and final products.
- The development of tests to detect, and processes to eliminate, infectious and toxic agents throughout the food chain.
- Research into the role of food in promoting and sustaining health with respect to diet and nutrition, toxicology, epidemiology, environmental interaction, consumer choice and public health.

39. The aim of the 'Control of Infectious Diseases' key action is to promote methods of control against major emerging or re-emerging infectious diseases (such as AIDS) linked to old, new or mutant agents. This would be achieved, primarily, by mixing complementary expertise in trans-disciplinary projects, by linking these activities to national and international organisations, and by encouraging the interface between academic research, policy makers, healthcare providers and pharmaceutical and veterinary institutes. Priority areas for research have been identified as:

- Research into the development of new vaccines against AIDS and other major infectious diseases caused by human and animal pathogens.
- Research to establish new strategies for the diagnosis, treatment and control of infectious diseases, to improve the control of drug resistant infectious agents, and to establish new or improved detection methods ensuring the safety of medicinal and veterinary products.
- Amelioration of the organisation within services that support public health as related to management and prevention of infectious diseases. To include analyses of the perception of the value of prevention and surveillance of such diseases.

40. Support is likely to be similar to Framework programme IV, namely:

i. Shared cost actions (EU contribution of up to 50% of total project costs).

ii. Concerted actions (EU contributions of up to 100% of co-ordination of activities).

41. The Ministry wishes to encourage applications from UK research organisations and small to medium sized enterprises. Furthermore, the Ministry will consider providing applicants with additional national support for shared cost actions where these are in accordance with the Ministry's own research requirements as defined in this document. Potential applicants are advised to contact the appropriate person listed in Annex II to discuss their ideas with a view to obtaining MAFF support.

42. Any queries relating to Framework V should be directed to:

- Mr L Broadbere, Telephone: 0171 921 1187.

  Applications should be submitted to:

  Mr L Broadbere

Ministry of Agriculture, Fisheries and Food
Room 632, St. Christopher House
80-112 Southwark Street
London
SE1 0UD

43. The first call for proposals in Framework V will be in December 98/January 99.

LINK PROGRAMME

44. The LINK initiative promotes partnership in research between industry and the research base, thereby stimulating innovation and wealth creation. LINK research, which is pre-competitive (*i.e.* with an element of risk), covers a wide range of technology and generic product areas from food and bio-sciences, through engineering to electronics and communications.

45. The LINK Sustainable Livestock Production Programme is jointly sponsored by MAFF and the Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) with further support on a project by project basis from the Biotechnology and Biological Sciences Research Council (BBSRC), the Economic and Social Research Council and the Department of Agriculture for Northern Ireland (DANI)

46. The aim of this programme is to initiate collaborative, pre-competitive research and technological development projects that enable UK livestock production to maintain its economic competitiveness, with due regard for animal health and welfare, and for environmental concerns.

47. The Ministry wishes to encourage applications by UK research organisations to the LINK programme.

48. For further details of the LINK Sustainable Livestock Programme please contact:

Dr Jennifer Gunning
Room 645, St. Christopher House
80-112 Southwark Street
Southwark
London
SE1 0UD
or E-mail: j.gunning@afdd.maff.gov.uk

MILLENNIUM COMPLIANCE

49. Successful applicants will be required to provide specific assurances that any software supplied will operate satisfactorily at the change of the century and beyond. Year 2000 compliance should be viewed as the 'ability for continued normal use of the software, such that neither the performance nor the functionality of the software will be affected by any changes to the date format caused by the advent of the year 2000. In particular, year 2000 compliance shall mean that no value for current date will cause any interruption in the operation of software; all manipulations of time-related data will produce the desired results for all valid date values within the application domain and in combination with other

products, prior to, through and beyond the year 2000; date elements in the interfaces and data storage will permit specifying the century to eliminate data ambiguity without human intervention, including leap year calculations; and where any date element is represented without a century, the correct century shall be unambiguous for all manipulations involving that element'.

TUBERCULOSIS RESEARCH

INTRODUCTION

51. The Krebs Report provides extensive background to the current knowledge about TB in cattle and badgers and the Government's role in controlling the disease. **Researchers considering submitting proposals on TB are strongly advised to read the Report.**

52. Policy on TB aims to protect the public by taking action against a disease transmissible to man. This is achieved by maintaining the officially TB-free status of cattle herds in Great Britain and reducing the number of new herd breakdowns. This requires the Ministry to maintain a nucleus of expertise and facilities at various institutions to:

- Enable rapid and accurate diagnosis of TB in livestock so that outbreaks can be detected accurately and action instituted in the field.
- Provide consultancy advice and to collect and analyse data from field investigations in support of control policy to enable MAFF to meet its statutory, EU and other obligations.
- Undertake vital research and development programmes to control TB by developing novel reagents such as vaccines and diagnostic tests.

53. **A meeting will be held in London in late June or early July, attended by the Animal Health Veterinary Group and the Chief Scientist's Group, which will provide an opportunity for potential contractors to ask questions relevant to the TB research programme. If you wish to attend this meeting, details may be obtained from:**

Mr Andrew Salisbury
Chief Scientist's Group
Room 664, St. Christopher House
80-112 Southwark Street
London
SE1 0UD
Telephone: 0171 921 3926
E-mail: a.salisbury@fvsd.maff.gov.uk.

Invitations will be restricted to 1-2 per research group.

Entry to the meeting will be by invitation only.

OBJECTIVES OF THE TUBERCULOSIS RESEARCH PROGRAMME

54. The research recommended by the Krebs Report includes some elements present in the existing MAFF-funded programme, but there are also some entirely new initiatives (for example, work on developing a vaccine for cattle).

55. MAFF will move significantly in the direction of **open competition** for research in the TB area to meet the Krebs Report recommendation for using the best expertise in the research community. In addition, some elements of the programme will be commissioned directly with research groups already working in this area in order to maintain expertise to meet policy needs for the TB control programme as a whole.

UNDERSTANDING THE CAUSES OF HERD BREAKDOWN

INTRODUCTION

56. The factors which affect the local variation in risk to individual herds are not presently understood. Mathematical models have been developed but their value is limited by insufficient data to address the fine-scale spatial variations in breakdown rates. Identification of the factors underlying spatial and temporal variations in *Mycobacterium bovis* infection in badgers and cattle would potentially allow identification of areas at high risk of herd breakdown and thus permit development of intervention strategies to reduce risk.

STRATEGIC RESEARCH REQUIREMENTS

57. Several risk factors have been investigated. A high badger density in a particular area may facilitate transmission of *M. bovis* to cattle in a number of ways:

- By increasing the prevalence of TB in badgers.
- By increasing stress and making badgers more susceptible to infection.
- By increasing contact rates between badgers and cattle.

In addition, climate and habitat may both be important contributory factors.

58. Currently funded projects have already started investigating factors which affect local variation in risk. Badger populations have been modelled with particular emphasis on the epidemiology of natural infection with *M. bovis*, the risk of spread to cattle, the role of badger immunity and the effects of potential control methods on the prevalence of infection within badger groups. Badger ecology has also been investigated to determine which factors influence population density, mortality and natality, movement and dispersal and territoriality. Ongoing research is examining the effect that features of the habitat, land use and other environmental variables contribute.

59. The Krebs Report recommends the collection of additional data from areas of high and low risk and from herd breakdowns and road accident surveys of badgers. In addition, an increase in the power of mathematical modelling by integrating the use of a variety of modelling approaches is recommended. This may contribute to a better understanding of disease transmission and complex, detailed simulations may be used to model the effectiveness of different intervention strategies. For example:

- Combining the use of geographical information systems (GIS) and epidemiological models to understand disease transmission on a wide spatial scale.
- Using statistical models to help design field trials to test the predictions of transmission models
- Linking economic and transmission models to enable the costs and benefits of different control strategies to be assessed.

60. It is envisaged that liaison between MAFF, Universities, Government Agencies and Institutes will ensure that the most appropriate data is collected and forms the basis for modelling approaches. In addition, links of this nature will provide the necessary breadth of

expertise and lead to a more complete understanding of disease transmission and to improved disease control strategies.

61. This research will be placed in two ways:

i. By commission with MAFF Agencies (Veterinary Laboratories Agency (VLA) and Central Science Laboratory (CSL)), to continue existing studies.
ii. By open competition to extend previous work and bring in new ideas.

62. All contractors, will be required to collaborate with each other and to develop collaborations with other centres of appropriate expertise nationally and internationally. Data collected by MAFF on TB breakdowns may be available to successful contractors. Therefore contractors should contact Mr Gillgan (see page 17) if they are proposing to utilise this data. **Plans for achieving this must be included in proposals**. MAFF invites proposals to:

A. *Integrate modelling approaches to better understand disease transmission over wide spatial scales and to assess the costs and benefits of different control strategies.*

B. *Assess the correlates of local variation in risk associated with TB transmission between badgers and cattle, taking into account badger density, M. bovis prevalence, husbandry, climate and landscape variables. Statistical analyses and epidemiological modelling should also take into account all relevant factors including cattle herd breakdowns and road traffic accidents involving badgers.*

C. *Investigate the role of other wildlife species, in areas with high herd breakdown rates, in the transmission of TB to cattle using field studies and risk analyses.*

63. Molecular analysis of mycobacteria has resulted in development of techniques for identification of strain diversity, epidemiology and transmission studies. A number of molecular typing systems are currently employed including Restriction Fragment Length Polymorphism (RFLP), Spoligotyping and Restriction Endonuclease Analysis (REA).

64. Spoligotyping has been used, by the VLA, to type approximately 2,600 isolates of *M. bovis* to help describe national patterns of TB infection in cattle and badgers. This work has revealed spatial clustering of spoligotypes and has provided a provisional association between spoligotypes found in badgers and in cattle. However, refinements to this technique are necessary to further clarify the typing of isolates and to aid elucidation of transmission routes.

65. **Molecular typing research will be commissioned at the VLA in order to retain the necessary facilities and expertise for surveillance, diagnosis and control activities. Proposals are also invited from groups with expertise in this field. Collaboration is encouraged.** Studies should be directed to meet the requirements set out in Section 'D' below:

D. *Develop sensitive and specific molecular typing techniques to enable a long-term study of TB transmission between wildlife, cattle and other species (including man) and to assess the variation of different genotypes of M. bovis.*

66. An improved typing system is required to help clarify badger-to-cattle transmission dynamics within intensively studied, but restricted, areas. **This research will be placed following open competition. Potential contractors may need to collaborate with other groups with expertise in molecular typing when this features in their proposal**. MAFF invites proposals to:

E. *Develop novel improved research techniques to establish TB transmission routes and to help elucidate local variation in risk.*

67. In addition, the current blood based immunological test for TB detection in live badgers, the BROCK test, is not sensitive enough for accurate epidemiological surveillance and control strategies.

68. This research will be placed by open competition but will require the contractors to collaborate with the VLA and/or CSL in order to gain access to the appropriate badger samples. **Potential contractors should therefore develop their proposals with the VLA, and/or CSL before submission.** Proposals are invited to:

F. *Develop improved tests, based on DNA amplification techniques, for M. bovis detection in badger carcasses, excreta and environmental samples.*

G. *Develop tests, for use in the living badger and based on their cellular immune response, to establish M. bovis prevalence.*

69. There is a low incidence of inconclusive reactions in animals tested using the tuberculin skin test which are inconclusive in the standard interpretation. These 'inconclusive reactor' animals are very costly as a retest is necessary after one, or more, intervals of 60 days, until the animals have a negative result. All inconclusive animals are placed under movement restrictions.

70. Use of defined antigens and alternative immunological measurements may allow the development of diagnostic tests for *M. bovis* in cattle that offer improvements in terms of sensitivity, specificity, quality control and overall reduced costs.

71. For example, the gamma interferon test is based upon the measurement of gamma interferon in the blood in response to the introduction of *M. bovis* antigen. This is a useful test which has the advantage of requiring a single farm visit for each herd test. Current, ongoing, research aims to improve the specificity of this test. **This research will be commissioned with the VLA, to retain the necessary diagnostic expertise for surveillance and control activities and will be directed to meet the requirements set out in Section 'H' below:**

H. *Utilise the gamma interferon test for M. bovis in cattle, incorporating existing or new diagnostic approaches and develop alternative immunological measurements.*

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

- **Dr Jan Whitby**, Chief Scientist's Group, Veterinary Science Unit,
  Telephone: 0171 921 3907, Fax: 0171 921 1121, E-mail: j.e.whitby@fvsd.maff.gov.uk
- **Mr Steve Gillgan**, Chief Veterinary Officer's Group,
  Telephone: 0181 330 8668, Fax: 0181 337 8600, E-mail: j.s.gillgan@ahvg.maff.gov.uk
- **Mr Jim Howell**, Animal Health Policy Group,
  Telephone: 0181 330 8019, Fax: 0181 337 3640, E-mail: j.howell@ahdc.maff.gov.uk

PLEASE READ CAREFULLY THE SECTION ENTITLED 'GUIDANCE FOR APPLICANTS' (PAGES 5-11) BEFORE SUBMITTING YOUR PROPOSAL

EVALUATING THE EFFECTIVENESS OF CURRENTLY AVAILABLE STRATEGIES TO REDUCE HERD BREAKDOWN

INTRODUCTION

72. Various badger control strategies have been used since 1975 to remove potentially infected badgers from farms with tuberculous cattle. The Krebs Report concludes that although there is compelling evidence to implicate the badger in many of these breakdowns, there has to date, been no properly controlled experimental study to enable conclusions to be drawn about the effectiveness of different culling strategies. It recommends that a randomised block experiment be set up to investigate three strategies for badger control in 'hot spot' areas. This experiment is being taken forward separately from the Research Requirements Document.

73. However, research will be commissioned to improve the understanding of those aspects of badger ecology which influence the effectiveness of culling for badger control. **Part of this research will be commissioned with the CSL, to maintain a nucleus of expertise necessary for badger epidemiology studies. In addition, proposals are sought from other groups with expertise in this field**. The studies should be directed to meet the requirements set out in Sections 'A' and 'B' below:

A. *Develop innovative methods to estimate badger populations by using field evidence of their activity.*

B. *Develop innovative methods to relate badger abundance and effects of disturbance on badger populations.*

74. Outside the experimental areas, the culling of badgers, under the so-called interim control strategy, has ceased. However, it is suggested that these areas would be suitable for testing a small number of proactive farm management practices to assess the extent to which these might be effective in reducing risk. It is likely that husbandry will play an important role in the long-term solution to the prevention of disease in cattle in some circumstances.

75. A comparison of husbandry practices to facilitate the multi-variate analysis of the risk of herd breakdown will be starting in 1998-1999. This analysis will also include data on climate, landscape variables, badger demography, origins of herd breakdown and data from

the road accident survey and provide quantitative evidence on the relative importance of badgers and other factors contributing to herd breakdown.

76. The Krebs Report has also recommended that the industry should take a lead in implementing work on husbandry, but MAFF will facilitate and provide advice on the design and analysis of the experiment.

77. Case-control studies are one approach to identifying the main differences in husbandry methods between farms suffering from herd breakdown and those, in the same area, not suffering a breakdown. Once these practices are identified, promising approaches may be investigated further. **Groups which might wish to participate in work of this kind are invited to register their interest.**

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

- **Dr Jan Whitby**, Chief Scientist's Group, Veterinary Science Unit,
  Telephone: 0171 921 3907, Fax: 0171 921 1121, E-mail: j.e.whitby@fvsd.maff.gov.uk
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DEVELOPING IMPROVED STRATEGIES TO REDUCE HERD BREAKDOWN

INTRODUCTION

78. The Krebs Report recommends that the best prospect for control of bovine TB is to develop a vaccine against *M. bovis* in cattle. This is a long term strategy that will involve a number of research and development organisations and success cannot be guaranteed. However targets and milestones have been identified to enable the monitoring and evaluation of progress at five yearly intervals:

i. Candidate vaccines will be generated and tested in laboratory animal models (*e.g.* mice and guinea pigs).
ii. Promising candidates will be evaluated in experimental challenge studies in the target host to establish appropriate vaccination protocols (dose, route of immunisation, *etc.*).
iii. Field trials will be carried out to determine efficacy and safety under operational conditions.

79. Major advances have already been made in human vaccine development which may benefit the development of a *M. bovis* vaccine. Vaccine development work will therefore be

co-ordinated to take account of appropriate analogous programmes for human TB (including genome sequencing and work on animal vaccines and diagnosis) in other countries. Particular note will need to be taken of the cattle vaccine work being carried out in other countries, especially New Zealand.

80. A badger vaccine would also be useful in reducing the likelihood of badger to cattle transfer and will therefore be retained as an alternative future option if the cattle vaccine requirements cannot be met.

81. The development of a cattle vaccine will necessitate additional studies:

- The development of an associated diagnostic test to distinguish infected cattle from vaccinated cattle.
- A study of the immune responses of cattle to *M. bovis*.
- The development of epidemiological models to evaluate the level of protection required of the vaccine.

82. Further research will also be funded to investigate new approaches to killing the mycobacterium. **Collaboration between researchers working on vaccines and diagnostics is essential.**

STRATEGIC RESEARCH REQUIREMENTS

83. A review of the veterinary use of TB vaccines was performed by a World Health Organisation (WHO)/Food and Agriculture Organisation of the United Nations (FAO)/Organisation Internationale des Epizooties (OIE) Consultation Group in 1994. This report identified two classes of vaccine candidate. The first class includes vaccines for which efficacy has been demonstrated in laboratory models of infection, and which could be evaluated in target host species within a relatively short time frame of approximately five years. Vaccine candidates currently available for testing include *Bacille Calmette Guerin* (BCG), crude antigenic derivatives of *M. bovis* (such as culture filtrate) and environmental mycobacterial species.

84. It is anticipated that the successful proposals for the research areas in this section will involve collaboration between a number of centres of expertise. In order to facilitate this process, MAFF convened a vaccine seminar, led by Professor Douglas Young and attended by experts in the field, to discuss the current situation in regard to animal vaccines and approaches to the future research. There will be an output document resulting from this meeting which may be obtained by contacting:

Mr Andrew Salisbury, Telephone: 0171 921 3926

85. **Research to meet the requirements described below in Sections 'A' to 'G' and 'I' and 'J' will be placed by open competition, whilst Section 'H' will be commissioned at the VLA. Groups submitting proposals on cattle vaccines are asked to indicate potential relevance to the development of badger vaccines and are encouraged to provide candidate vaccines and technology support for use at the VLA in developing a badger vaccine (see Section 'H').** Proposals are invited to:

A. *Investigate vaccine candidates currently available for testing, such as BCG and crude antigenic derivatives of M. bovis, for the development of a vaccine for TB in cattle within a relatively short time frame.*

86. In the longer term, two general strategies are envisaged for the production of new vaccine candidates. The first strategy is based on the use of live attenuated mycobacterial strains which may be engineered to contain inactivated or deleted genes that are essential for the disease process. This strategy would involve the release of genetically manipulated organisms into the environment and thus questions of stability and safety are of paramount importance. Proposals are invited to:

B. *Develop a live attenuated vaccine for TB in cattle, based upon a mycobacterial strain, genetically modified to ensure efficacy, stability and safety.*

87. The second strategy is based on the induction of immune responses to the component antigens of *M. bovis* delivered in the form of a subunit vaccine which has three possible forms:

i. Purified antigens incorporated into an adjuvant.
ii. Expression of the antigens as recombinant products in another attenuated bacterial or viral vaccine vector.
iii. The direct administration of the genes encoding the relevant *M. bovis* antigens in the form of a DNA vaccine.

88. The development of a sub-unit vaccine should take into account the possible selection of strains of *M. bovis* resistant to the vaccine. The use of antigens encoded by essential genes, or the use of multiple antigens, should avoid this problem. Proposals are invited to:

C. *Develop a vaccine for TB in cattle based upon antigenic elements of M. bovis.*

89. The development of a vaccine to control TB in cattle requires an understanding of bovine immunology, in particular the nature of the bovine immune response to *M. bovis* as well as identification of antigens which are useful in vaccination or diagnosis. It is envisaged that elements of the laboratory based research will apply to the development of a tuberculosis vaccine targeted towards cattle, badgers or humans. The work builds on the research already undertaken for MAFF at the VLA, the Institute of Animal Health (IAH, Compton) and for the DANI at the Veterinary Science Laboratory, Northern Ireland. MAFF invites applications for projects to:

D. *Investigate the immune responses of cattle to M. bovis with the aim of identifying antigens which may be useful in vaccination or diagnosis.*

E. *Investigate whether mucosal immunity has a role to play in preventing the establishment of M. bovis infection. In addition, investigate the role mucosal immunity has to play in the establishment of an effective response to vaccination (by aerosol) by the respiratory route.*

90. Use of a vaccine to control TB in cattle in the EU is not possible at present as it would compromise the existing tuberculin skin testing system. It will, therefore, be crucial to

develop a specific diagnostic test to differentiate between vaccinated and infected animals, including those that have become infected after vaccination. It may also be necessary to engineer the vaccine to include a molecular 'tag' to allow the positive identification of vaccinated animals. Proposals are invited to:

F. *Develop a diagnostic test to differentiate between infected and vaccinated cattle alongside the development of a cattle vaccine.*

91. Where herd breakdowns are due to a wildlife source of infection, a widespread, and possibly long term, programme of vaccination would be needed. However, a cattle vaccine would not necessarily need to be 100% protective. It will be necessary to model the use of a vaccine to determine the level of efficacy required to secure eventual control of the disease. This will include studies of cattle in high and low risk areas to determine the efficacy required, if a vaccine were used alongside other control methods (*e.g.* reduction of infection in badgers and husbandry). In addition, a cost-benefit analysis of an effective vaccine will need to be undertaken to analyse the benefit ratios of a number of alternative control strategies. MAFF invites applications for a research project to:

G. *Develop epidemiological models to evaluate the level of vaccine efficacy required to effect control of TB in cattle and badgers and to determine the level of efficacy required when additional control measures are used in addition to vaccination. Determine the cost benefit ratios of alternative control systems.*

92. The Krebs Report recommends that studies to develop a badger vaccine continue in parallel with the development of a cattle vaccine during the first five years of the programme. A test system, appropriate for the badger, will be required to evaluate promising vaccine candidates. Research continues to have a need for test systems based on animal models as well as on the target species. Therefore, the ongoing commissioned research at the VLA will continue in the short term to:

H. *Develop a vaccine for TB in badgers in collaboration with work under the cattle vaccine programme.*

93. Strategies for controlling human disease are based upon the vaccination and treatment of infectious cases. Treatment regimes can be prolonged and require careful administration of multiple drugs. Incomplete therapy actively promotes the development of drug-resistant *M. bovis*, which has the potential to lead to a major public health hazard.

94. However, there are new approaches to killing the organism by viruses (known as bacteriophages) that may have potential to reduce or destroy *M. bovis* in the environment. The Krebs Report recommends that further consideration should be given to evaluating the prospects for developing successful techniques in biological control. MAFF invites proposals to:

I. *Conduct a feasibility study into the prospects for developing successful biological control techniques to destroy M. bovis in the environment.*

J. *Develop techniques for biological control of M. bovis in the environment using bacteriophages.*

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

- **Dr Jan Whitby**, Chief Scientist's Group, Veterinary Science Unit,
  Telephone: 0171 921 3907, Fax: 0171 921 1121, E-mail: j.e.whitby@fvsd.maff.gov.uk
- **Mr Steve Gillgan**, Chief Veterinary Officer's Group,
  Telephone: 0181 330 8668, Fax: 0181 337 8600, E-mail: j.s.gillgan@ahvg.maff.gov.uk
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FOOD-BORNE ZOONOSES RESEARCH

INTRODUCTION

95. The reduction of risk to public health from animals and their products is a major determinant of research needs for animal health and food safety. In addition, MAFF takes into account the recommendations from the Advisory Committee on the Microbiological Safety of Food (ACMSF).

96. Zoonotic diseases of man, such as those caused by *Salmonella, Campylobacter* and *Escherichia coli* O157:H7 are increasingly giving rise to public concern, both in the UK and the EU. It is widely accepted that these infections are often transmitted to man through direct contact with animals or by eating contaminated food. Such diseases are difficult to control as infected animals or birds often appear healthy, whilst acting as carriers and excreting the organism.

97. Increased public concern over food quality, animal welfare and environmental contamination is likely to lead to calls a reduction in the overall use of antibiotics and chemotherapeutics. Without the development and wider use of alternative disease control strategies, there may be increased risk to public health from food-borne zoonoses.

98. Livestock products play a significant role in meeting consumer demand for food and the annual turnover of the livestock sector amounts to over £9.5 billion including meat, milk and eggs.

99. A Review of the MAFF funded research on bacterial food-borne zoonoses on-farm and Meat Hygiene was performed in June 1997. This examined the current research programmes and provided guidelines for the direction of research in the future. To obtain a copy of the Outcome Report please contact:

Mr Andrew Salisbury Telephone: 0171 921 3926

These guidelines were further defined following two MAFF Workshops on *Campylobacter* and *E. coli* O157:H7 on-farm, held in January 1998.

OBJECTIVES OF THE FOOD-BORNE ZOONOSES PROGRAMME

100. The overall objective of this programme is to reduce the exposure of the food chain to zoonotic infections in animals presented for slaughter. To achieve this objective it is necessary to control infections in animals and contamination on farm. This objective is integrated with others to:

- Help minimise the risk of zoonotic infections being transmitted to man.
- Reduce the use of medicinal products for the control of zoonotic infections in animals and thereby minimise any risk to the consumer in food and risks to the environment from residues and antibiotic resistant organisms.
- Improve animal welfare in a manner consistent with viable economic performance by controlling these infections more efficiently in animals on farm.

101. In support of these objectives, a further aim is to maintain nuclei of expertise at the strategic level on a range of zoonotically important diseases to promote food safety and to encourage projects, co-funded with industry and the EU, that meet the objectives already described.

ESCHERICHIA COLI O157:H7

INTRODUCTION

102. The Pennington Report, published in 1997, addressed the circumstances leading to the 1996 outbreak of *E. coli* O157:H7 infection in central Scotland, highlighted the severe challenges for existing food safety systems and identified the need for future research.

103. *E coli* O157:H7 is known to exist in a wide range of animals and birds. However, it is currently accepted that the main source of this bacterium, as a hazard for the human food chain, is the presence of the organism in the alimentary tract of cattle and, possibly, sheep. The bacteria can be excreted in faeces, and found in animal manure or slurry, which can in turn be the source of environmental and water contamination, including contamination of animal and human foods such as vegetables. There is also evidence that this bacterium is spread between animal carcasses through contamination by faecal matter during the slaughter process.

104. Current ongoing MAFF research is investigating the colonisation, persistence and epidemiology of *E coli* O157:H7 in cattle. This research programme complements the larger programmes of the Food Safety and Science Group and the Department of Health (DoH).

STRATEGIC RESEARCH REQUIREMENTS

105. Little is understood of the pathogenesis of this infection in animals. As already stated, the bacterium usually causes no clinical signs of disease in animals. In humans, the disease can range from asymptomatic (although excreting bacteria), to relatively mild, to being so severe that it may lead to death.

106. A clearer understanding of the distribution of infection, any pathology, colonisation, host specificity and virulence of this bacterium in animals is essential to the development of preventative and control measures. **New research on *E coli* O157:H7 will be placed by open competition**. Proposals are invited to:

A. *Perform studies of the distribution of infection and pathogenesis of E. coli O157:H7 in cattle and sheep using modern molecular techniques to better understand infection in animals including colonisation, host specificity and virulence determinants.*

107. Existing means of protecting the food chain are directed towards improving food hygiene. Clearly, it is also important to work towards improved and novel methods of control in the animal so that the infectious challenge to food hygiene controls is reduced. Proposals are invited to:

B. *Develop improved and/or novel control methodologies for E. coli O157:H7 in the animal and on-farm.*

108. MAFF wishes to implement a rational and targeted approach to the development of both preventative and control measures for *E. coli* O157:H7-induced food poisoning. This will involve the development of a systems analysis methodology based upon a complete and comprehensive risk assessment. The ultimate aim will be the production of a modelling system which can be used to identify key critical control points for risk management and decision support on farm. Proposals are invited to:

C. *Develop a systems analysis methodology to elucidate and evaluate the critical control points for E. coli O157:H7 in cattle and sheep from farm to abattoir.*

109. **MAFF also has requirements relating to the application of sewage sludge, animal slurry, and abattoir waste to land and the distribution of *E. coli* O157:H7 in the environment. A further call for proposals will be held later in the year, following discussions between the various interested funders, once the requirements have been identified in greater detail.**

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

- **Dr Jan Whitby**, Chief Scientist's Group, Veterinary Science Unit,
  Telephone: 0171 921 3907, Fax: 0171 921 1121, E-mail: j.e.whitby@fvsd.maff.gov.uk
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- **Mr Julian West**, Animal Health Policy Group,
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CAMPYLOBACTER

INTRODUCTION

110. *Campylobacter jejuni*, and related species, are the most frequently isolated pathogens from cases of human gastro-intestinal disease in the UK and are thus a major public health and economic burden.

111. In its 1993 Interim Report on *Campylobacter*, the ACMSF concluded that, among other things, 'The sources and routes of transmission of campylobacter infection are not yet fully understood, but there is strong circumstantial evidence to suggest one major source is poultry, transmission being either directly through consumption of undercooked chicken or by cross contamination of other foods in the kitchen'. As a result, a number of research projects in this area were commissioned by MAFF, the DoH and other funding bodies. In

1996, the Committee published its 'Report on Poultry Meat'. One of the key conclusions of the Committee was that pathogen carriage rates can be substantially reduced by appropriate action and that this is crucially dependent upon each link in the 'farm to fork' chain receiving appropriate attention.

112. The Ministry has a programme of *Campylobacter* research in place at the VLA. This includes strategic research which aims to control *C. jejuni* in chickens using competitive exclusion, and molecular studies which aim to understand the events surrounding colonisation, enteroinvasiveness and the nature of virulence. **In addition, a centre of typing expertise exists at the VLA and continues to work, in collaboration with other groups, to establish an optimal 'working' typing strategy for both human and veterinary use. The work at the VLA will continue to be funded in order to retain the necessary facilities and expertise for surveillance, diagnosis and control activities.**

113. Most of the priorities identified at the recent MAFF Review of food-borne zoonoses and the *Campylobacter* Workshop are already in place at the VLA, or will be starting in 1998/99.

114. Work at VLA, PHLS and elsewhere has advanced the development of strain typing methodologies. The Ministry is not looking for new methodologies, however, a degree of instability has been noted in *Campylobacter* strains isolated *in vitro*. There is, therefore, a need to identify the factors involved in the instability of zoonotic strains of veterinary campylobacters and to elucidate whether these factors lead to problems in typing methodologies. Proposals are invited to:

A. *Investigate the instability of zoonotic strains of Campylobacter found in food producing animals with the aim of elucidating improvements to existing typing methodologies.*

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

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SALMONELLA

INTRODUCTION

115. The Ministry has been funding research in this area for many years and has an extensive programme of research in place. Applied strategic research on pathogenesis within the *Salmonella* programme underpins the applied specific research on:

- improving diagnostic tests and strain identification;
- developing rationally attenuated vaccines;
- performing epidemiological studies.

116. As well as research aimed at controlling infections in individual animals, research has also been undertaken to investigate ways of preventing spread of infection into groups of animals. Studies of the immunology of *Salmonella* species could lead to improved sero-diagnostic methods and to the development of both *Salmonella* vaccines and, as a long term aim, identification of host-determined resistance factors.

117. The large epidemiology programme has benefited from improved diagnostic tests and has provided valuable information for assessing the risk factors associated with salmonella infections in general and antibiotic resistance strains, such as DT104, in particular.

RESEARCH REQUIREMENTS

118. A pre-requisite for the *Salmonella* pathogenesis programme is the identification of factors which influence colonisation, multiplication, invasiveness and elimination of salmonella organisms in the host species. **Ongoing and new strategic research, outlined in Section 'A' below, will be commissioned at the IAH, in collaboration with the VLA as necessary, to retain a nucleus of expertise for future technology support, surveillance and control activities.**

A. *To perform strategic studies on the pathogenesis and molecular biology of salmonella serotypes, evolution of S. typhimurium and predictions of the emergence of potential new pathogenic salmonellas.*

119. Although good progress has been made in detection methods for *Salmonella* species, there is a need to develop sensitive, specific and simple molecular typing systems to underpin epidemiological and transmission studies. **To obtain maximum value these studies need to be applicable throughout the food chain and therefore collaborative proposals, placed by open competition, would be particularly welcomed**. Proposals are invited to:

B. *Develop sensitive and specific molecular strain-typing techniques to enable accurate studies of the epidemiology of Salmonella species on farm.*

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

- **Dr Jan Whitby**, Chief Scientist's Group, Veterinary Science Unit,
  Telephone: 0171 921 3907, Fax: 0171 921 1121, E-mail: j.e.whitby@fvsd.maff.gov.uk
- **Mr Paul Gayford**, Chief Veterinary Officer's Group,
  Telephone: 0181 330 8064, Fax: 0181 330 8600, E-mail: p.j.r.gayford@ahdc.maff.gov.uk
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ANTIBIOTIC RESISTANCE AND THE DEVELOPMENT OF ALTERNATIVE DISEASE CONTROL STRATEGIES

120. There are increasing concerns about the potential threat to man from the development of antibiotic resistant strains of micro-organisms within livestock production systems. The real contribution of farming practices to the prevalence of human infections due to antibiotic resistant bacteria has yet to be elucidated.

121. **The development of microbial antibiotic resistance is currently under discussion by the Microbial Antibiotic Resistance Working Group. The report from this Group is awaited in order to identify the key areas of research for MAFF funding. There will be a further call for research in this area later in the year**.

NON FOOD-BORNE ZOONOSES RESEARCH

INTRODUCTION

122. MAFF policy objectives for non-food-borne zoonoses are to:

- Minimise the risk of zoonotic infections being transmitted to man.
- Maintain a nucleus of applied, strategic and specific research expertise on a range of diseases in order to have a suitable spread of expertise available for controlling diseases of potential policy importance.
- Perform applied specific research to investigate new and emerging diseases detected through national surveillance or international intelligence.

123. Zoonotic diseases of man which are, or might be, acquired from livestock or poultry are an increasing cause of public concern. Although livestock attendants, abattoir workers and others run the greatest risk of exposure to non-food-borne zoonotic pathogens, the public may be at risk at agricultural events, at 'open farms', children's zoos and other similar events. Recreational water sports may expose the public to certain diseases and walkers in certain wildlife habitats may be exposed to livestock diseases transmitted by arthropods.

NEW AND EMERGING DISEASES

124. Novel diseases in livestock may potentially represent human health hazards. Therefore such diseases need to be characterised so that the risk to human health can be assessed. Changes in the epidemiological features of known zoonotic diseases must be monitored to assess possible changes in their significance.

RABIES

125. Rabies is considered to represent such a threat to animal and human health that controls, aimed at preventing its introduction, have been made the subject of legislation. The Government is currently reviewing these controls, and will publish a consultative document in due course. Implementation of any statutory controls depends on the effectiveness of detecting the causal virus and understanding its transmission and spread. Research is therefore essential to give an understanding of the epizootic and pathogenic mechanisms involved in the disease.

BRUCELLA

126. MAFF has a statutory obligation to control and eradicate Brucellosis from farm animals in Great Britain for reasons of animal and public health. *Brucella abortus*, the species affecting cattle, has been eradicated from GB which is now officially 'Brucellosis-Free'. In addition, neither *B. melitensis* of sheep and goats nor *B. suis* in pigs is found in GB. However, these diseases do occur in EU member states and other countries from which

animals are imported. Thus research is commissioned to control the risk to national herds and man from the entry of *Brucella* spp. to GB.

127. **There are programmes of research currently in place which fulfil all of the research requirements for the non food-borne zoonoses programmes and details of these may be found in Annex IIIa. However, when these research projects come to an end, more non-food borne research may become available for open competition.**

ANIMAL WELFARE RESEARCH

INTRODUCTION

128. The Government is committed to the achievement of the highest possible welfare standards for the keeping, transporting, marketing and slaughter of farmed livestock. In the case of legislative requirements, the aim is to achieve improvements through EU measures which impose the same minimum standards on producers in all the member states.

OBJECTIVES OF THE ANIMAL WELFARE RESEARCH PROGRAMME

129. The overall objective of the research programme is to resolve uncertainties as to the exact nature of welfare requirements, to identify ways in which they can be met under commercial conditions and, more generally, to ensure that policy decisions and the UK input into EU negotiations are based on sound science.

130. Detailed objectives addressed by the current programme and specific requirements for new work starting in 1999/2000 are given below, and are generally intended to improve methods for assessing welfare so as to determine the extent and severity of welfare problems and the effectiveness of proposed solutions.

131. Projects involving collaboration between research providers and with industry are encouraged.

ON-FARM WELFARE: POULTRY

STRATEGIC RESEARCH REQUIREMENTS

132. One of the main objectives of the welfare research programme is to investigate and develop acceptable alternatives to the conventional battery cage, which satisfy the welfare requirements of the hen and the viability of the commercial system. As part of the overall poultry welfare research programme, the Ministry has a particular requirement for research to investigate factors relating to the welfare of broiler chickens (including leg weakness) and turkeys.

133. There is a need to establish appropriate stocking densities for broilers kept in modern highly sophisticated houses and in older and more basic housing, which is based on sound scientific research. These studies should take into account the need for all birds to be able to reach food and water easily, to be able to exercise, dust bathe and wing flap, and walk normally. Recognition should be made of the factors relevant to good litter management and conditions appropriate to avoid heat stress. Conclusions should state the maximum stocking density in kg/m^2 at slaughter weight, taking into account likely mortality and culling rates. Applications are invited for research proposals to address:

A. *A study to determine the appropriate stocking density for the range of different housing systems used for broiler production in the UK. (Collaboration between researchers and the industry is strongly encouraged).*

ON-FARM WELFARE: RUMINANTS (SHEEP AND CATTLE)

STRATEGIC RESEARCH REQUIREMENTS

134. The Ministry is particularly concerned over the extent of lameness in cattle and sheep, subjects which have both been identified by Farm Animal Welfare Committee (FAWC) as requiring further study and seeks to commission research to identify ways in which the incidence in either species can be reduced or prevented.

135. Sheep lameness is a common welfare problem. Studies should build on the survey and epidemiological work that has already been done, with the object of developing prevention and control strategies, especially for lameness caused by the various forms of "foot rot". In particular, the studies should seek to establish a greater understanding and knowledge about new variants or novel agents causing "foot rot". Applications are invited for research proposals to address the following:

A. *To investigate the causes of foot rot in sheep and to develop effective prevention and control measures.*

136. Research is required to determine whether all-year round housing allows dairy cows to exhibit normal behaviour. Attention should be given to deprivation of ability to obtain food by grazing, social behaviour (including effects of early separation of dam from calf), space allowances and social structure, housing design and health (in particular lameness and mastitis). Applications are invited for research proposals to address the following:

B. *Dairy cattle - behavioural studies relating to welfare of cows housed all-year round.*

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

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- **Mr Edward Varley**, Animal Welfare Division (AWD), 'On Farm Welfare',
  Telephone: 0181 337 8118, Fax: 0181 330 8764, E-mail: e.m.varley@aw.maff.gov.uk
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WELFARE DURING HANDLING, TRANSPORT AND SLAUGHTER

137. The Ministry's programme of research is intended to provide a better understanding of the way animals respond to transport and to determine factors relating to vehicle design, handling and stocking of animals on vehicles and feeding, watering and rest requirements for

livestock on long journeys. The programme also seeks to develop a scientifically informed understanding of the ways in which the welfare of animals immediately before and during slaughter may be compromised and how these can be avoided.

138. In order to better evaluate animals' responses to stress factors during transport, there is a need to develop multi-channel invasive or non-invasive monitors which will enable information to be gathered on a range of physiological parameters without interference with the animals and for the information to be assessed against external environmental conditions. Physiological parameters should include heart rate, core body temperature, respiration rate and blood pressure. These measurements should be supplemented by biochemical and neurochemical measurements.

139. The monitors should be developed with a view to applicability across the range of farmed animals to measure critical events in the animal's life, from just after birth to slaughter. Devices should be useable under everyday farming, transport and slaughter procedures. Applications are invited for research proposals to address the following:

A. *To develop the use of remote sensors to monitor the transport environment, and the response to that environment, in animals being transported.*

140. It is necessary to identify, characterise and quantify the major stressors to which pigs are exposed during commercial transport and their physiological and behavioural consequences. It is expected that this work will contribute to modelling which will establish the acceptable range and limits for stressors both individually and in combination and define precisely optimum transport environments. Applications are invited for research proposals to address the following:

B. *To understand and alleviate physiological stress during transportation of pigs.*

FURTHER INFORMATION

For advice on specific issues, prospective contractors are strongly advised to contact:

- **Dr Stephen Dixon**, Chief Scientist's Group, Veterinary Science Unit,
  Telephone: 0171 921 3896, Fax: 0171 921 1121, E-mail: s.dixon@scd.maff.gov.uk
- **Mr Edward Varley**, Animal Welfare Division (AWD), 'On Farm Welfare',
  Telephone: 0181 337 8118, Fax: 0181 330 8764, E-mail: e.m.varley@aw.maff.gov.uk
- **Mr Mike Lomas**, AWD, 'Transport, Handling and Slaughter',
  Telephone: 0181 337 8790, Fax: 0181 330 8764, E-mail: j.lomas@ahwvs.maff.gov.uk

PLEASE READ CAREFULLY THE SECTION ENTITLED 'GUIDANCE FOR APPLICANTS' (PAGES 5-11) BEFORE SUBMITTING YOUR PROPOSAL

BSE AND RELATED DISEASES RESEARCH

141. MAFF supports a substantial programme of research on transmissible spongiform encephalopathies (TSE's) which relates principally to strategic research on BSE and scrapie. The projects are established on the advice of SEAC and other expert bodies as well as the requirements of policy groups within MAFF. The programme is co-ordinated with the programmes of other Government departments, the Wellcome Foundation and the European Commission, all of whom have a substantial financial commitment to TSE research. Co-ordination is intended to ensure that there is no unnecessary overlap of research activities and that identified gaps in the research programme are taken up by the appropriate funding body.

142. The MAFF programme is broadly broken down into four categories which include projects on both BSE and scrapie:

- Epidemiology
- Diagnosis
- Pathogenesis
- Transmission

The projects in the currently funded programme are listed in Annex III.

143. The largest part of the programme concerns studies related to BSE in cattle, but there is also a significant component on both BSE and scrapie in sheep. Because of the importance of BSE to both public health and animal health the programme is managed to enable flexibility of response to the commissioning of research according to the evolution of the disease situation, the recommendations of expert Committees, in particular SEAC, and the needs of policy-makers. The detailed requirements of this programme are thus not included in this document.

144. MAFF currently have an 'open door policy' to the submission of other research proposals for funding under this programme. Proposals will be considered in the light of the results of previous and ongoing research, the recommendations to the Department by expert groups and Departmental requirements. Research workers are thus free to submit proposals for evaluation in the standard format required by the Chief Scientist's Group described on Pages 5-11. It is recommended, however, that those considering making proposals for the first time should consult with the Veterinary Science Unit at the following address before making a full submission:

Chief Scientist's Group
Food and Veterinary Science Division
BSE Branch
St Christopher House
80-112 Southwark Street
London SE1 0UD
Telephone: 0171 921 3854; Fax: 0171 921 1121

145. Depending on the nature of the proposed work, proposers are advised of the following:

- There may be particular requirements for the handling and containment of the agents being studied.

- It will be necessary to confirm the availability of certain types of materials that may be required for the study, for example, tissues or body fluids from infected animals.

Consideration may need to be given to the availability of suitable animal accommodation with the necessary effluent disposal conditions, particularly where livestock are used for studies.

ANNEX I: ABBREVIATIONS AND ACRONYMS

ACMSF	Advisory Committee on Microbiological Safety of Food
AHVG	Animal Health Veterinary Group
AWD	Animal Welfare Division
BCG	Bacille Calmette Guerin
BBSRC	Biotechnology and Biological Sciences Research Council
CSG	Chief Scientist's Group
DANI	Department of Agriculture, Northern Ireland
DoH	Department of Health
EU	European Union
FAO	Food and Agriculture Organisation (of the United Nations)
FAWC	Farm Animal Welfare Committee
GIS	Geographical information systems
HACCP	Hazard Analysis Critical Control Point
IAH	Institute of Animal Health
IP	Intellectual property
IPR	Intellectual property rights
MAFF	Ministry of Agriculture, Fisheries and Food
OIE	Organisation Internationale des Epizooties
REA	Restriction Endonuclease Analysis
RFLP	Restriction Fragment Length Polymorphism
SEAC	Spongiform Encephalopathy Advisory Committee
SOAEFD	Scottish Office Agriculture, Environment and Fisheries Department
TB	Tuberculosis
VLA	Veterinary Laboratories Agency
WHO	World Health Organisation

ANNEX II: GUIDANCE ON COMPLETION OF THE APPLICATION FORM FOR A RESEARCH CONTRACT WITH MAFF

1. The attached application form should be used for all applications for research funding in response to the requirements listed in this document.

2. Before completing the form you should read carefully the notes in the Introduction Section of this Requirements Document.

3. The application form contains guidance notes on how the form should be completed. However, if you find difficulty or require clarification, you may call for advice on the following helplines:

* **TB, Food-borne and Non-Food-borne Zoonoses Programme:**

4. For advice or information on specific scientific issues (i) or the policy background/objectives of the programme (ii or iii), contractors are invited to contact:

i. **Dr Jan Whitby**, Chief Scientist's Group, Veterinary Science Unit,
Telephone: 0171 921 3907, Fax: 0171 921 1121, E-mail: j.e.whitby@fvsd.maff.gov.uk

ii. **Mr Paul Gayford**, Chief Veterinary Officer's Group,
Telephone: 0181 330 8064, Fax: 0181 330 8600, E-mail: p.j.r.gayford@ahdc.maff.gov.uk

iii. **Mr Steve Gillgan**, Chief Veterinary Officer's Group,
Telephone: 0181 330 8668, Fax: 0181 337 8600, E-mail: j.s.gillgan@ahvg.maff.gov.uk

iv. **Mr Jim Howell**, Animal Health Policy Group,
Telephone: 0181 330 8019, Fax: 0181 337 3640, E-mail: j.howell@ahdc.maff.gov.uk

v. **Mr Julian West**, Animal Health Policy Group,
Telephone: 0181 330 8089, Fax: 0181 330 8419, E-mail: j.c.west@ahdc.maff.gov.uk

* **Animal Welfare Programme:**

6. For advice or information on specific scientific issues (i) or the policy background/objectives of this programme (ii or iii) please contact:

i. **Dr Stephen Dixon**, Chief Scientist's Group, Veterinary Science Unit,
Telephone: 0171 921 3896, Fax: 0171 921 1121, E-mail: s.dixon@scd.maff.gov.uk
ii. **Mr Edward Varley**, Animal Welfare Division (AWD), 'On Farm Welfare',
Telephone: 0181 337 8118, Fax: 0181 330 8764, E-mail: e.m.varley@aw.maff.gov.uk
iii. **Mr Mike Lomas**, AWD, 'Transport, Handling and Slaughter',
Telephone: 0181 337 8790, Fax: 0181 330 8764, E-mail: j.lomas@ahwvs.maff.gov.uk

* **Completion of the Application Form:**

Mr Andrew Salisbury, Chief Scientist's Group, Veterinary Science Unit,
Telephone: 0171 921 3926, Fax: 0171 921 1121, E-mail: a.salisbury@fvsd.maff.gov.uk

* **General Enquiries:**

7. General enquires which do not relate to either of the above should be made on the following number:

HELP LINE : Telephone: 0171 921 1269

Ministry of Agriculture, Fisheries and Food
Chief Scientist's Group, St Christopher House,
Southwark Street, London SE1 0UD
Telephone No. 0171 928 3666

For MAFF Use Only	
Proposal Code	
Date received	

Application for a Research Contract with MAFF

Applicants should complete each part of the form as fully and clearly as possible.
To move from one fill-in location (field) to another, press the **UP** or **DOWN** arrow or click the location, **unless directed otherwise**.

GENERAL

1. Proposer's full name and title
2. Position held
3. E-mail address
4. Name and address of organisation
5. Tel. No. (incl. STD code)
6. Fax No.

Postcode

7. (a) Project title **(maximum 120 characters)**
   (b) Abstract of research. To include the main objective, policy relevance and intended use of results.

(c) Total cost to MAFF (ex. VAT)

(d) Date submitted to MAFF

SECTION ONE - SUMMARY

4. (a) Sub-contractor's name(s) and address(es) (if applicable):

Postcode

Postcode

(b) Joint contractor's name(s) and address(es) (if applicable:

Postcode

Postcode

5 (a) MAFF reference under which proposal has been submitted e.g. Central Strategic Research Fund or other open competition advertisements, Food Research Requirements or ROAME A forms (i.e. MAFF customer guidance on the problems to be addressed and the required objectives of the research).

(b) Duration in years (or months if less than one year)

(d) Proposed start date

6. **Summary of total estimated costs (excluding VAT).** This should include the costs of the research work which will be funded by (a) MAFF, (b) Bodies other than MAFF, (c) 'in kind' contributions as a cash value, as appropriate.

Funding bodies	Year 1	Year 2	Year 3	Year 4	Year 5	Total (£)

(a) MAFF						
(b) other than MAFF						
(c) 'In kind'						
TOTAL COST						

N.B. Applicants are advised to clear the costs at question 19 with their respective Finance departments and to agree the value of any 'in kind' contributions with those involved with the work before completing this summary.

SECTION TWO - SCIENCE

MAFF funds research in support of its policy requirements. These are described in the MAFF R & D Strategies, and individual programme objectives may be described in more details in ROAME A's or in documentation supporting advertised calls for proposals.

7. **Purpose.** Summarise the scientific or technical problem which you propose to address and give reasons why MAFF support should be given.

8. **Scientific context.** Please describe how your proposal relates to the current state of knowledge (full reference, see Annex B) and in which ways the results will advance scientific/technical understanding.

9. **Objective(s).** Please give details of (a) each scientific objective, (b) to what extent theses objective(s) are interdependent; and (c) whether any factors exist to delay achievement of the objective(s). Where there is more than one contractor, please show clearly below the roles of each.

   (a) **Scientific objective(s).** (Technical and Scientific aims of the research which must be measurable and timebound, please number the objectives). **If your application is accepted, these Scientific objectives will be included in the agreement between you and the Ministry. Please, therefore, restrict your entry to the salient points and set these out clearly and concisely.**

   (b) **Interdependence of objective(s).** To what extent does the success of one scientific objective depend on the successful completion of another**? How essential is each scientific objective in achieving the overall objective.**

   (c) **Please give details of any particular factors which might cause delays in the achievement of these objective(s).** What are the chances of this happening; what are the probable consequences; and what steps will you take to prevent this happening?

10. (a) **Approaches and Research Plan.** Outline the experimental approaches to be used in realising the scientific objectives and set out the work plan for the life of the project stating clearly how you intend to proceed. Please number the Approaches in the same way as the Objectives. Where there is more than one contractor, please show clearly below the roles of each. **If your application is accepted, the Approaches and Research Plan will be included in the agreement between you and the Ministry. Please therefore, restrict your entry to the salient points and set these out clearly and concisely.**

    (b) Will the research require a survey to be carried out, or a questionnaire to be used? ☐
    (Surveys are only acceptable if they form an essential part of the project.
    Ministerial approval is required, and time must be allowed for this before any agreement is signed.)

11. **Milestones.** Based on your research plan, please give milestones (i.e. points at which progress can be assessed) with target days for monitoring progress of the research towards the scientific objectives. Each milestone should relate to one scientific objective, i.e. the milestones for objective 1 should be numbered 01/01, 01/02 etc. Each milestone title should not be more than 120 characters, a description is optional.

(a) **Primary** milestones. (These must number no more than four in each project year. Achievement of each must be **essential** if the objectives of the project are to be met. If your application is accepted, they will form part of the agreement between you and the Ministry.)

Milestone	Target date	Title

(b) **Secondary** milestones.(These are unrestricted in number. They should be helpful to the management of the project but not essential to the achievement of the objectives. If your application is accepted, they will not form part of the agreement between you and the Ministry. Please prefix number of milestones with an S to indicate that it is a **Secondary** milestone.)

Milestone	Target date	Title

12. **Quality Assurance**. Please state what procedures you operate for Quality Assurance, including registration to BS 5750/ISO 9000, NAMAS or GLP.

13. Does any of the work outlined in the proposal require a licence from the Home Secretary under the Animal Scientific Procedures Act 1986?

14. **Equipment devoted to project**

(a) Please list the existing capital equipment which you will use for this project.

(b) Give justification for, and estimated cost of any new capital equipment which will have to be purchased for this project for which you expect MAFF to contribute. N.B. MAFF will not normally contribute to the cost of any new item that will duplicate one already in your possession. (See Section 3, note 19(d).)

15. **Staff effort**

(a) Please list the names and grades of staff who will work on the project together with details of their specialism (including relevant papers published).

(b) Please state how many working days equals one staff year **days**

(c) **Summary of staff time involved**

You should show here the staff years (to first decimal place only) expected to be spent on the project for each grade of staff involved, including both scientists and assistants, during each year of the project.

	STAFF TIME					
Grade	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL TIME
TOTAL STAFF YEARS						

16. **Communication of results**

(a) How will the results be communicated? Please list anticipated numbers and if possible expected dates for submission of e.g. publication in refereed journals, trade journals or the press, presentations or demonstrations to the scientific community in trade organisations and internal reports or publications.

N.B. In any publication including press articles, the financial support of the Ministry MUST be acknowledged.

(b) What measures will be taken to encourage technology transfer?

17. **Benefits**

(a) Please describe and quantify the benefits which may arise from this project, how the results will be used and who will make use of the results of this research (e.g. Ministry, industry or consumers).

(b) Do you think further research or development will be needed before these benefits can be realised?

(c) Is the proposed research likely to lead to: (i) patentable results?

(ii) commercially negotiable results?

If **YES**, please give details including interest already expressed

18. **Other details**

(a) Is this work currently or about to be submitted in another application elsewhere?

If **YES**:
- to which organisation?
- and by what date is a decision expected?

(b) With reference to questions 6(b) and (c) please give a brief description of the nature of their contribution. (A letter agreeing to the collaboration should be attached to this application.)

(i) Funding contributions other than MAFF

(ii) 'In kind' contributions

SECTION THREE - RESOURCES

FINANCIAL GUIDELINES FOR PROJECT COST ESTIMATES

Once a price for the project has been agreed with the Ministry, and an agreement signed, no increase in price can be considered. **Please note that any over or underspends in any one project year cannot be carried over into the next project year.**

The following Notes are to help you provide all the details necessary for the project costs.

19. (a) **Pay costs**

You should include the costs of personnel working directly on the project. Your costings must be supported by a detailed breakdown showing for each person separately:

(i) the amount of staff time (e.g. number of days, months or years) by grade / salary bands for each year of the project including staff to be recruited;

N.B. An explanation should be given where the staff effort increases or decreases during the life of the project.

(ii) the proposed annual salary (including London (or other town) Weighting Allowances, employers NI and Superannuation) and salary spine point (i.e. pay band) of each person during each year of the project.

In appropriate cases, the Ministry is willing to accept pay calculations on the basis of average pay costs. In this event you should indicate the average pay used for the grade(s) in question.

(b) **Inflation**

(i) If the project is submitted under a competition, a percentage to cover inflation can be built into the price, but please bear in mind that overall cost is a factor in the selection process.

(ii) If the project is not submitted under a competition, costings must be submitted at current prices, and MAFF will add an allowance for inflation in line with the Treasury's forecast of GDP deflator.

(c) **Consumables**

These will be essentially scientific laboratory supplies, (e.g. glassware, chemicals) costing individually up to £2,000 in value which are purchased from third parties. Please list separately all consumables to be used, including, if possible, quantities.

(d) **Equipment**

Capital equipment is a fixed asset costing over £2,000 in value which is expected to yield continuous service beyond the year in which it is purchased. It includes items such as scientific and information technology equipment. **The equipment must be essential to the carrying out the project.** Three quotations **must be** obtained for each item of equipment. (See note (ii) below.)

For new equipment the Ministry will only fund that proportion of its working life (normally 5 years) to which it is used solely on the project (i.e. if a project is of 3 years duration the Ministry will fund $^{3}/_{5}^{th}$ of the cost at the rate of 1/5 each year. Where equipment has a useful life of more than 5 years and/or is used for other purposes, you should make an appropriate reduction in the annual rental charged to the Ministry. Where new equipment is required please give details of the make, model, price and the year when each item is to be purchased and its purpose. Likewise, please indicate when equipment is to be leased from the manufacturer and give details of the costs of rental for each year.

A piece of equipment may need to be allocated full-time to a project. In such a case, the fact that an organisation owns a similar piece of equipment for use on other projects does not remove the need here for that equipment to be either purchased or hired, although the usual rules on the amount to be paid will apply. It is however for the contractor to justify such a purchase.

You may be asked by the Ministry to provide the following as appropriate:

(i) the **original** purchasing invoice or top copy of the rental agreement. This will be returned immediately after a copy has been taken; **and**

(ii) the original written quotations obtained from three different suppliers.

N.B. In appropriate cases e.g. where it can be shown that the technical specification of equipment precludes all but a single supplier, a single oral/written quotation will be acceptable.

(e) **Travel**

Visits to conferences and similar functions in the U.K. or elsewhere and any foreign visits **will not** normally be regarded as an eligible cost. Exceptionally, however, such costs may be funded where you can demonstrate to the Ministry's satisfaction that the visits are**essential** to the project.

Where travel costs are necessary, details of their frequency, purpose, destination, the mileage and rate per mile (for road travel), air/rail fares, and number of persons travelling should be given.

(f) **Overheads**

Central and departmental costs (direct) that underpin the research activities and costs (indirect) which cannot readily be uniquely assigned to particular research projects. These may include the following:

- financial services (finance, accounting, tendering, marketing);
- personnel services;
- staff facilities (transport, health and safety, training, welfare, laundry);
- departmental services (administration, library, secretarial, printing, minor stores items and laboratory and workshop support);
- staff management, and cover for maternity and long-term sickness benefits.

You should include details of the method of calculation of the overhead rate, (to be expressed as a percentage of direct salary costs (excluding Superannuation and NI) plus consumables) and list **separately** the items covered.

(g) **Sub-contracts, consultancy fees, etc.**

You should show that this work is essential to the success of the project. Any costs under this heading must be identified separately.

Please detail **separately** the component parts of any consultancy or sub-contract, including pay costs, consumables, equipment, travel, overheads and other costs which have been included.

(h) **Other costs**

You should include here items which do not readily fit under the headings provided e.g. laboratory/analytical services, laboratory animals, servicing of equipment, any non-equipment rental charges, recruitment costs, computer software, stationery items, student registration fees and glasshouse heating.

You should also provide a short explanation of the need for all the items you list here.

(i) **VAT**

Businesses who are registered for VAT should include their registration number and the full amount of VAT to be charged to the Ministry.

(j) **Ineligible costs**

The following are excluded from eligible costs:

- interest charges;
- hire purchase interest and any associated service charges;
- profit earned by a subsidiary or by an associated undertaking on work sub-contracted under the project;
- input VAT (an allowance may be negotiated with organisations with limited scope for recovery of input VAT);

N.B. Contingency allowances expressed as an arbitrary percentage overall addition to eligible costs are excluded.

20. **Estimated total project (all funding bodies) - detail**

Before completed this section you should read carefully the Notes above which explain what project costs the Ministry is prepared to consider. These must be project year figures, not financial year costs.

Project year	Year 1 £	Year 2 £	Year 3 £	Year 4 £	Year 5 £	TOTAL £
Pay costs (see note a)						
Consumables (see note c)(specify)						
Equipment (see note d)(specify)						
Travel expenses (see note e) (specify)						
Overheads (see note f) (specify)						
Sub contracts, consultancy (see note g)						
Other costs (see note h)						
TOTAL PROJECT COSTS*						
VAT (see note i)						

(i) Are you registered for VAT? ☐

If YES what is your VAT registration number? ☐

Excluding VAT : See also note 19(b) - non-competitive work must be costed at current prices.

SECTION FOUR - DECLARATION

Declaration

I confirm that I have read this application and MAFF's standard contractual terms and conditions and that:

(a) MAFF may show this application to third parties for the purposes of obtaining expert opinion on its scientific merits; and

(b) if granted, the work will be accommodated and administered in our Organisation in accordance with MAFF's contractual arrangements. The staff gradings and salaries quoted are correct and in accordance with the normal practice of this Organisation.

21. (a) **Head of Department**

Signature | Date

Name and initials

Organisation

(b) **Administrative Authority**

Signature | Date

Name and initials

Position

Organisation

Full postal address

Postcode

Telephone No. (including STD code) Ext.

22. Name of project leader (if different to 1)

Full postal address of project leader

Postcode

Telephone No. (including STD code) Ext.

Fax No. (including STD code)

Note: This application should be submitted by/through:

(a) **the Head of Department**; and

(b) **the officer who will be responsible for administering any funds that may be awarded.**

Each should sign the above declaration.

You now need to complete a separate ANNEX A for each person who is to be engaged on the research. Please also complete ANNEX B. To do this, please use the CSG7A.dot provided.

ANNEX A

CURRICULUM VITAE OF STAFF TO BE ENGAGED ON THE RESEARCH

Please complete a separate form for each person to be engaged in the scientific aspects of the work

1. Surname | Forename(s)
2. Degrees:
3. Posts held (with date(s). Where personal support is requested please identify tenure and source of funding of present post:
4. Recent publications and/or papers in the press:

ANNEX B

BIBLIOGRAPHY

References should be cited only as a number on the form, with full details listed here. All reference listed should be numbered in the order that they appear on the form and should include a full list of authors, year, full title, publication, title, volume number and page numbers.

Press enter

ANNEX IIIA CURRENT PROJECTS IN THE MAFF ZOONOSES AND ANIMAL WELFARE (PART) RESEARCH PROGRAMMES

PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
	ZOONOSES **FOOD-BORNE ZOONOSES** *E. coli 0157 H:7*			
OC9616	Epidemiology and risk factor analysis of E. coli 0157 in farm animals.	01/04/97	31/03/00	34,721
OZ0133	E. coli 0157:H7 colonisation and persistence in cattle	01/04/97	31/03/00	113,340
OZ0138	A longitudinal study of faecal excretion of Vtec 0157 in cattle to determine epidemiological patterns to include the effect of transportation and marketing between farm and abattoir on levels of E coli 0157:H7 in cattle and sheep	01/04/98		0
	Perform a Review of the diagnostic tests currently available	01/04/98		0
	Salmonella			
OZ0125	Characterisation of the surface protein antigens of Salmonella with special reference to fimbriae	01/04/95	31/03/98	137,462
OZ0128	The role of fimbrial antigens, in the pathogenesis of Salmonella enteritidis infections in poultry	01/04/95	31/03/98	53,157
OZ0131	Live salmonella vaccines for the protection of poultry	01/04/97	31/03/98	113,191
OZ0134	Epidemiological studies of multiresistant Salmonella typhimurium in pigs	01/04/97	31/03/00	188,361
OZ0135	Epidemiological studies of multiple resistant S.typhimurium DT 104 infection in cattle	01/04/97	31/03/00	119,148
OZ0306	Hygienic design & manufacture for pathogen free poultry feed production	01/04/96	31/03/99	30,934
OZ0307	Analysis of the molecular basis of salmonella host specificity	01/04/96	31/03/99	143,480
OZ0308	Mechanisms of pathogenesis and immunity in salmonella induced enteritis	01/04/96	31/03/99	139,260
OZ0309	The role of defined bacterial genes and host genetic back- ground in intestinal colonisation of poultry by salmonella	01/04/96	31/03/99	236,320
OZ0310	Early protection, colonisation inhibition and immunity against salmonellosis in chickens, pigs and calves	01/04/96	31/03/99	147,000
	Investigate Salmonella contamination and decontamination practices, on egg laying farms. To investigate and identify hazard control points for the prevention of egg contamination during egg production	01/04/98		0
	Investigate the transmission of Salmonella in egg packing stations.	01/04/98		0
	Campylobacter			
OZ0117	Epidemiological studies to investigate risk factors for Campylobacter infection in broiler flocks	01/04/94	11/07/97	0
OZ0129	The development of a vaccine against Campylobacter jejuni in chickens	01/04/95	31/03/98	124,181
OZ0130	Competitive exclusion of Campylobacter jejuni in chickens	01/04/95	31/03/98	162,368
OZ0140	Veterinary Campylobacter Reference Facility	01/01/98	31/03/98	44,399

ANNEX IIIA CURRENT PROJECTS IN THE MAFF ZOONOSES AND ANIMAL WELFARE (PART) RESEARCH PROGRAMMES

PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
	Use sensitive molecular techniques to elucidate the molecular basis of virulence in poultry (and its relationship to virulence in humans), colonisation in poultry and enteroinvasiveness in both humans and poultry	01/04/98		0
	Investigate the use of competitive exclusion of virulent Campylobacter jejuni species as a method of control for infection in poultry	01/04/98		0
	Antibiotic resistance			
OZ0132	Antibiotic resistance mechanisms in Salmonella and Campylobacter	01/04/97	31/03/00	83,289
	WATER-BORNE ZOONOTIC DISEASES			
OZ0403	The host specificity, pathogenesis and molecular classification of zoonotic protozoa isolated from livestock	01/04/97	31/03/00	122,630
	TUBERCULOSIS			
SE0112	The development of lab. procedures for the detection of cellular antibody response to bovine TB	01/04/95	31/03/98	303,652
SE0113	Immunological methods for detecting naturally acquired immunity to M. bovis in badgers	01/04/95	31/03/98	113,413
SE0114	Molecular biological approaches to improved TB diagnosis	01/04/95	31/03/98	261,957
SE0115	An epidemiological and ecological study of a badger population naturally infected with M. bovis	01/04/95	31/03/98	92,562
SE0116	Bovine TB in badgers and the risks to cattle: a spatial analysis	01/10/95	30/09/98	14,047
SE0117	Perturbation study (culture and serology of mycobacterium bovis at CVL)	01/05/95	31/12/97	5,991
SE0118	Perturbation studies of TB in badgers	01/03/95	28/02/98	47,354
SE0121	An ecological & epidemiological study of a badger population naturally infested with M. bovis	01/04/95	31/03/98	260,877
SE0125	Modelling badger populations, the epidemiology of natural infection with m. bovis, the risk of spread to cattle.....	01/04/96	31/03/98	115,977
SE0126	Analysis of European badger (M. meles) population dynamics & social organisation in a pop naturally infected with M. bovis	01/04/96	31/03/99	91,780
SE0128	Molecular typing of Mycobacterium bovis	01/04/97	31/03/98	81,443
SE0129	Development of vaccine candidates for protection of badgers against infection with Mycobacterium bovis	01/04/97	31/03/98	145,534
SE0130	The development of animal models to test candidate vaccines for M. bovis infection in badgers	01/04/97	31/03/98	174,442
SE0132	Badgers and bovine tuberculosis a proactive strategy for the control of bovine TB in badger populations	10/11/97	09/11/99	10,358
ZE0502	Modelling badger populations, the epidemiology of natural infection with M. bovis, the risk of spread to cattle and	01/04/98	31/03/99	
ZE0503	The consequences of perturbation caused by badger removal for the control of TB in cattle: a study of behaviour,	01/04/98	31/03/99	0
ZE0509	An epidemiological study of a badger population naturally infected with M. bovis	01/04/98	31/03/99	0
ZE0511	Longitudinal study of natural Mycobacterium bovis in badgers	01/04/98	31/03/99	0
ZE0512	The development of new and improved diagnostic tests for bovine tuberculosis	01/04/98	31/03/99	0

ANNEX IIIA CURRENT PROJECTS IN THE MAFF ZOONOSES AND ANIMAL WELFARE (PART) RESEARCH PROGRAMMES

PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
ZE0513	An ecological and epidemiological study of a badger population naturally infected with M.bovis (was SE0121)	01/04/98	31/03/99	0
ZE0521	Development of vaccine candidates for protection of badgers against infection with Mycobacterium bovis	01/04/98	31/03/99	0
ZE0522	The development of animal models to test candidate vaccines f+B80o+B38r M. bovis infection in badgers	01/04/98	31/03/99	0
	Multivariate risk analysis	01/04/98		0
	BRUCELLOSIS			
SE0302	Studies on false positive Brucella test reactions and methods to improve diagnosis in cattle and pigs	01/04/97	31/03/00	227,646
	RABIES			
SE0407	Expression of rabies glycoprotein in baculovirus for use in a rapid diagnostic kit for antibody level determination	01/04/95	31/03/98	85,370
SE0408	Differentiation of strains of rabies and rabies-related viruses using automated sequence analyses	01/04/96	31/03/99	72,190
SE0410	Biology and control of the mammalian vectors of rabies	01/04/96	31/03/99	189,097
SE0411	Development of rapid PCR-based systems for the detection and differentiation of rabies and rabies related viruses	01/04/97	31/03/00	116,516
SE0412	Rabies defence measures in the Channel tunnel - foxes and DNA fingerprinting	01/02/98	31/03/98	5,645
	NEW AND EMERGING DISEASES			
SE0503	New and emerging diseases	01/04/96	31/03/98	47,217
SE0504	New and emerging diseases (A) Evaluation of TGE persistence in the national herd	01/04/97	31/03/98	31,117
SE0505	New and emerging diseases (D) studies on ovine axonopathies with particular reference to aetiology and improving	01/01/98	31/03/99	27,544
SE0506	New and emerging diseases (E) multiple anthelminthic resistance of sheep nematodes: drenchrite kit validation	01/04/97	31/03/98	31,597
SE0507	New and emerging diseases (B) development of an immunodiagnostic test for C. sordellii infection in sheep	01/04/97	31/03/98	26,817
SE0510	Investigations into the occurrence of mycoplasma species in respiratory disease in cattle.	01/01/98	31/03/99	9,146
SE0511	Caseous Lymphadenitis in sheep development of improved methods for diagnosis	01/04/98	31/03/99	
	OTHER NON-FOOD-BORNE ZOONOSES			
OD0102	Lyme disease- an investigation of UK strains of Borrelia burgdorferi & assessment of the sheep as a competent reservoir	01/04/97	31/03/00	58,059
	ANIMAL WELFARE RESEARCH			
	POULTRY WELFARE RESEARCH			
AW1112	Avian dyschondroplasia - a molecular study	01/04/95	31/03/98	93129

ANNEX IIIA CURRENT PROJECTS IN THE MAFF ZOONOSES AND ANIMAL WELFARE (PART) RESEARCH PROGRAMMES

PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
AW1113	The role of 25-hydroxyvitamin D in preventing tibial dyschondroplasia in broilers	01/05/96	30/04/99	53205
AW1114	Leg weakness in broilers - welfare implications & control strategies	01/04/95	31/03/98	82000
AW1115	The welfare of laying hens in alternative systems B115	01/04/95	31/03/98	33000
AW1116	Neural and behavioural assessment of chronic arthritic pain	01/04/97	31/03/02	111566
AW1117	Food restriction in large breeding birds: a genetic analysis of multiple ovulation in broiler breeder females	01/04/97	31/03/00	136550
AW1118	Further investigation of bone biology to improve poultry welfare	01/04/97	31/03/00	70000
AW1119	Cognition, frustration, and aggression in domestic poultry	01/04/97	31/03/01	107237
AW1120	Prevention of osteoporosis in laying hens	01/04/97	31/03/01	139720
AW1121	The investigation of the bone and joint pathologies contributing to pain and lameness in meat-type chickens.	01/04/97	31/03/00	52861
AW1122	Aggression: influence of environment, experience and behavioural variation	01/04/97	31/03/01	142134
AW0206	The modification & environmental enrichment of layer cages	01/04/94	31/03/98	200975
AW0210	Improving the welfare of turkeys by determining preferences for lighting, stocking density and pecking substrates	01/01/96	31/12/98	73138
AW0211	Improving laying hen welfare in alternative systems : The effect of colony size and resource on behaviour	01/12/96	30/11/98	179254
AW0212	Development of a simple quantitative method of assessing the extent of gait abnormalities in broilers in commercial	01/01/98	31/12/01	13585
AW0213	Identify the principle microbiological agents responsible for and main factors associated with infective causes of leg	01/01/98	31/12/01	29384
AW0214	The development of a predictive model of damaging pecking in laying hens	01/02/98	31/01/01	17129
AW0215	The effect of feed withdrawal schedules and light programmes on the predisposition of broilers to poor leg health	01/04/97	31/03/99	111002
AW0216	Modification of broiler growth profiles using quantitative feed control techniques to reduce mortality & skeletal	01/04/97	31/03/99	89544
AW0217	Importance of dustbathing in laying hens - Is there a need to perform this behaviour	01/04/97	31/03/00	49290
	RUMINANT WELFARE RESEARCH.			
AW1001	A study of ovine lameness	01/06/94	31/05/97	19462
AW1002	Quantification of the pain associated with castration in lambs & development of novel analgesiac methods	01/10/95	31/12/98	72030
AW1003	Development for commercial application of more humane methods for castration & tail docking of lambs.	01/04/96	31/03/99	25000
AW1004	Study of the quality and growth rate of hoof horn in growing heifers.	01/07/98	30/06/01	
OC9317	A novel approach to the aetiology of bovine laminitis aiming to develop control & prevention strategies	01/10/94	30/06/98	47439
	WELFARE DURING HANDLING AND TRANSPORT			
AW0806	Depopulation of laying hens	01/04/93	31/03/97	13000

ANNEX IIIA CURRENT PROJECTS IN THE MAFF ZOONOSES AND ANIMAL WELFARE (PART) RESEARCH PROGRAMMES

PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
AW0807	The welfare of poultry in stationary vehicles and crates in lairage prior to slaughter	01/09/95	31/08/97	68872
AW0808	Long distance road transport of farm animals	01/04/97	31/03/02	156763
AW0809	To understand and alleviate physiological stress during transportation of livestock	01/04/97	31/03/02	156514
AW0908	Literature reviews of cattle, deer and ostrich transport	01/01/98	31/03/98	14700
AW0912	Welfare during handling and transport in pigs	01/04/96	31/03/98	122000
AW0915	Behaviour and welfare of breeding pigs during extended journeys	01/08/96	31/03/98	59791
AW0917	The effect of transporting cattle by road for 30 hours	01/04/97	31/08/98	170000
	LINK WELFARE PROJECTS			
LK0421	Strategic control of sheep blowfly	01/10/94	30/09/97	14689
LK0428	Integration of semiochemicals into management systems for livestock nuisance flies [was P188]	01/11/95	31/10/98	75037
LK0437	Improved handling systems for pigs at slaughter	01/04/95	31/03/98	68040

ANNEX IIIB

CURRENT MAFF RESEARCH PROGRAMMES FOR WHICH REQUIREMENTS ARE NOT INCLUDED IN THE ANIMAL HEALTH RESEARCH REQUIREMENTS DOCUMENT FOR 1999/2000

	ENDEMIC AND EXOTIC DISEASES; PIG WELFARE ON-FARM; WELFARE AT SLAUGHTER; VETERINARY MEDICINES; BSE			
PROJECT	**TITLE**	**START DATE**	**END DATE**	**EST. COST 97/98 (£)**
	ENDEMIC DISEASES			
	ENDEMIC BACTERIAL DISEASES			
OC9512	Towards the improved diagnosis, prognosis and control of neosporosis in cattle	01/04/96	31/03/99	72,906
OD0211	Molecular approaches to the specific detection of leptospira hardjo-bovis	01/04/95	31/03/98	81,275
OD0212	Phylogenetics of Leptospira spp. and other spirochaetes; typing and differentiation	01/04/98	31/03/01	0
OC9308	Studies on S. suis at the cellular and molecular level	01/06/94	30/09/97	18,733
	ENDEMIC VIRAL DISEASES			
OC9426	The development of diagnostic assays for the detection of anti-BIV antibodies in cattle sera	01/10/95	30/09/98	92,601
OD0304	Improved methods for the diagnosis of ruminant alphaherpes virus infections in relation to the control of IBR	01/04/96	31/03/99	49,926
OD0326	Virulent forms of acute BVD	01/04/96	31/03/99	129,552
OD0330	Development of a molecular basis for tracing changes in animal influenza: analysis of HIN2 viruses new to pigs	01/04/96	31/03/99	70,424
OD0335	BVDV: Virological and epidemiological studies of naturally occurring means of spread	01/04/95	31/03/98	90,689
OD0336	Bovine viral diarrhoea virus: use of a mathematical model to predict the impact of disease control measures.	01/04/96	31/03/98	12,594
OD0337	Development of molecular strategies for the detection and identification of retrovirus infection in ungulates	01/04/97	31/03/00	78,371
OD0339	Follow-up study of the epidemiology and economics of BVD virus infection in BVD virus naive dairy herds.	01/01/98	31/03/01	24,602
	ENDEMIC PARASITIC DISEASES			
OD0506	Immunological Control of Psoroptes ovis Infections In Sheep	01/04/96	31/03/99	319,709
OD0507	The non-chemical control of sheep scab; a systems modelling approach combining ecology, ethology and epidemiology	01/07/96	30/06/99	73,410
OD0511	Mechanisms of infection and immunity in coccidiosis	01/04/96	31/03/99	443,100
OD0526	Ageing and typing of ectoparasite infestations in sheep	01/04/95	31/03/98	117,177
OD0527	Non-chemical methods for the control of Ectoparasites	01/04/95	31/03/98	40,158
OD0528	An ELISA test for the sero-diagnosis of Sarcoptic mange in pigs	01/04/95	31/03/98	10,465
OD0529	Delaying the onset of anthelmintic resistance - development of a model for parasitic gastroenteritis in sheep	01/04/97	31/03/00	68,492
OD0532	Research reviews of coccidiosis and arthropod-borne diseases	01/12/97	31/03/98	21,584

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PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
	STRATEGIC RESEARCH ON ENDEMIC POULTRY DISEASES			
OD0707	To produce probes for the poultry MHC locus, and identify haplotypes that confer resistance to MDV and of viruses	01/10/95	30/09/98	103,063
OD0708	Genetic basis of susceptibility to myeloid leukosis induced by subgroup J avian leukosis viruses	01/01/98	31/12/00	0
OD0709	Genetic and immune basis of protection against infectious bursal disease virus (IBDV) by defined molecular vaccines	01/04/97	31/03/00	61,200
OD0710	The genetic basis of innate and immunological resistance to Marek's disease virus in chickens	01/04/97	31/03/00	122,400
	IMMUNE CONTROL OF RESPIRATORY DISEASES OF CALVES			
OD1604	Identification of immunologically important sites on respiratory syncytial virus proteins	01/04/95	31/03/98	144,235
OD1605	Role of immune effector mechanisms in protection against and pathogenesis of RSV infections	01/04/95	31/03/98	269,344
OD1606	Role of accessor cells in inducing immunity in the respiratory tract	01/04/95	31/03/98	155,391
	MASTITIS			
OD1705	The role of the hyaluronic acid capsule and leucocyte toxin in the resistance of streptococcus uberis to phagocytosis	01/04/96	31/03/99	135,040
OD1706	Isolation and characterisation of active site peptides from the plasminogen activator of streptococcus uberis	01/04/96	31/03/99	122,380
OD1707	Utilisation of amino acids and milk protein derived peptides by streptococcus uberis	01/04/96	31/03/99	122,380
OD1708	Dynamics of intramammary infection in dairy herds	01/04/96	31/03/99	143,480
OD1709	Review of research on Mastitis	01/11/97	31/12/97	7,500
	CORONAVIRUS DISEASES OF AGRICULTURAL IMPORTANCE			
OD1904	Development of coronavirus vectors to study control of replication and transcription	01/04/96	31/03/99	232,100
OD1905	Production of coronavirus recombinants to study pathogenicity, attenuation and antigenicity	01/04/96	31/03/99	126,600
OD1906	Review of research on coronavirus	01/11/97	31/12/97	7,500
	LINK SUSTAINABLE LIVESTOCK PRODUCTION			
LK0609	Avian rhinotracheitis virus (ARTV): Identification of protection-inducing proteins and mechanisms of variation	15/02/97	14/02/00	17,142
	EXOTIC STATUTORY DISEASES			
SE0710	Development of specific serological tests for contagious bovine pleuropneumonia using defined antigens	01/04/96	31/03/99	59,898
SE0711	Determination of Aujesky's disease virus latency in inconclusive or anomalous serological reactors	01/04/96	31/03/99	52,618
SE0716	ELISA for the detection of antibodies to bovine leucosis virus in pooled milk samples	01/04/96	31/03/99	38,718
SE0733	Avian Influenza: Determination of the molecular basis for pathogenicity using viruses from the Norfolk 1991 outbreak	01/04/94	31/03/98	18,126
SE0741	Classical Swine Fever: molecular epidemiology and rapid diagnosis	01/04/95	31/03/98	68,263

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PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
SE0744	Virulence assessment of Newcastle disease virus utilising a non-radioactive probe	01/04/95	31/03/98	15,741
SE0746	Polymerase chain reaction technique for diagnosis of mycoplasma agalactiae infection in small ruminants	01/04/95	31/03/98	48,994
SE0747	Development of molecular biological techniques to detect and differentiate mycoplasmas of the Mycoides cluster	01/04/95	31/03/98	20,584
SE0748	Virulence assessment and epizootiological tracing of Newcastle disease virus in chickens using recombinant antibodies	01/04/97	31/03/01	55,402
SE0749	Determination of the origin of highly pathogenic avian influenza- viruses by phylogenetic analysis	01/07/97	30/06/00	54,554
SE0750	Equine viral arteritis: variation between strains in terms of antigenicity genetics, and virulence	01/04/97	31/03/00	44,213
	AFRICAN SWINE FEVER			
SE1506	The development of specific probes for defining immune function in healthy and African swine fever virus infected	01/04/97	31/03/00	161,600
SE1507	Investigation of African swine fever virus encoded genes which interfere with signalling pathways	01/04/97	31/03/00	117,300
	ORBIVIRUSES			
SE2604	Interaction between orbiviruses and their hosts (BTV/sheep/ cattle, AHSV/horses, EHDV/deer)or vector (Culicoides) species	01/04/96	31/03/99	155,085
SE2605	Structural and functional analysis of Bluetongue Virus, African Horse Sickness Virus, EHDV and related orbiviruses	01/04/96	31/03/99	132,100
	MOLECULAR STUDIES FOR FMDV			
SE2703	Assembly and surface properties of FMDV	01/04/96	31/03/99	247,925
	VACCINE DEVELOPMENT FOR FMDV			
SE2804	Protective immune responses induced by FMDV vaccine	01/04/96	31/03/99	52,750
SE2805	Antigenic properties of vaccine virus strains	01/04/96	31/03/99	47,475
	EXOTIC DISEASE DEVELOPMENT OF DIAGNOSTIC TESTS & CONTROL METHODS			
OC9413	Development of a decontamination system for animal wastes with specific emphasis on Swine Vesicular Disease and ASF	01/10/95	30/09/98	109,135
SE2910	Investigate the carrier state in pigs recovered from swine vesicular disease	01/04/97	31/03/00	25,500
SE2911	Identification of animals persistently infected with FMDV	01/04/97	31/03/00	71,400
SE2912	Improved selection methods for emergency FMD vaccines	01/04/97	31/03/00	150,960
SE2913	Tracing the origins of FMD outbreaks	01/04/97	31/03/00	137,700
OC9416	Further analysis of immune development following vaccination against FMD	03/04/95	31/03/98	65,981
SE1113	Application of newer technologies for diagnosis of FMD and other vesicular viruses	01/04/97	31/03/00	117,300
SE1114	Serological tests to differentiate infection from vaccination in FMD	01/04/97	31/03/00	56,100

ANNEX IIIB

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PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
	STATUTORY DIAGNOSTIC SERVICES FOR EXOTIC VIRUS DISEASES			
SE1605	Diagnosis and surveillance for arbovirus infection, rinderpest virus infection and capripoxvirus of livestock.	01/04/97	31/03/98	95,625
SE1606	Diagnosis and surveillance for African swine fever	01/04/97	31/03/98	19,125
SE1607	Diagnosis and surveillance of FMD and other vesicular virus infections of livestock	01/04/97	31/03/98	254,745
SE1608	Diagnosis and surveillance of FMD and other vesicular infections of livestock	01/04/98	31/03/99	0
SE1609	Diagnosis and surveillance for African swine fever	01/04/98	31/03/99	0
SE1610	Diagnosis and surveillance for arbovirus infection, rinderpest virus infection and capripox infection of livestock	01/04/98	31/03/99	0
	PIG WELFARE RESEARCH			
AW0106	Maximising piglet welfare, survival and growth in community lactating systems	01/04/94	31/08/98	175806
AW0107	Welfare of pregnant sows when fed ad libitum	01/04/94	31/03/98	197074
AW0108	Effect of group size & feeding method on the welfare of group housed sows	01/07/94	30/06/98	61488
AW0109	Welfare of finishing pigs in existing and new housing environments	01/04/95	31/03/99	125684
AW0110	Development of a novel methodology for assessing the subjective state of suffering in farm animals	01/03/95	28/02/98	56113
AW0111	Effects of the neonate environment on behaviour, behavioural needs and welfare of pigs from birth up to slaughter weight	01/06/95	30/05/98	54094
AW0112	The effect of management practice on the welfare of outdoor sows	01/09/95	31/08/98	20998
AW0113	Novel group-farrowing systems to improve sow welfare and reduce piglet mortality	01/04/96	31/03/99	52298
AW0115	Minimising aggression during mixing of newly weaned sows	01/12/96	30/11/99	175133
AW0116	Understanding and controlling stress and aggression in the post-farrowing sow	01/01/97	31/12/99	61364
AW0118	Stress, nest building and maternal behaviour in sows	01/04/97	30/09/01	103418
AW0119	Stress physiology and welfare of pigs	01/04/97	30/09/00	150000
AW0120	Degenerative joint disease in pigs	01/04/98	31/03/01	0
OC9420	Investigation of epidemiology and pathology of degenerative joint disease to aid understanding and prevention	01/04/95	30/06/98	26138
	WELFARE AT SLAUGHTER			
MH0105	Welfare at slaughter - red meat species	01/04/95	31/03/98	99000
MH0106	Welfare at slaughter - poultry waterbath stunner design	01/04/95	31/03/98	36000
MH0107	Welfare at slaughter - stunning and exanguination of poultry	01/04/95	31/03/98	40500
MH0111	Stunning tongs and stunning tong electrode development	01/04/97	31/03/00	51336
MH0112	The development of an alternative stunning system for use in casulty slaughter of poultry	01/10/96	30/09/99	8525

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PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
MH0113	Evaluation of transcranial magnetic stimulation (tcms) as a method of stunning	01/04/97	31/03/00	63845
MH0114	Alternative stun/kill techniques for poultry	01/04/98	31/03/02	0
AW0807	The welfare of poultry in stationary vehicles and crates in lairage prior to slaughter	01/09/95	31/08/97	68872
	Veterinary Medicines (Immunological products)			
VM0110	Development of alternative methods for the virulence testing of NDV isolates	01/04/96	31/03/99	50999
VM0116	Development of an in-vitro potency test for swine erysipelas	01/04/96	30/11/97	65634
VM0117	The maintenance and monitoring of VMD standard virus preparations	01/04/96	31/03/99	19507
VM0118	The development of a monoclonal antibody-based ELISA for measuring antibodies to leptospira vaccines	01/04/96	31/03/99	108289
VM0119	Evaluation of alternative methods for the detection of porcine cytomegalovirus in veterinary vaccines	01/04/97	31/03/99	24165
VM0120	Detection of reticulonendotheliosis virus as an extraneous agent in avian products	01/04/97	31/03/98	19865
VM0121	Development of in vitro assay to replace the hamster potency test used for evaluating commercial L.hardjo vaccines	01/12/96	31/05/98	41992
	Veterinary Medicines (Pharmaceuticals)			
VM0210	Production of immunoaffinity columns for the extraction, purification & concentration of residues from food materials	08/08/95	07/08/97	40792
VM0219	Capillary electrophoresis for the determination of veterinary drug residues in food	01/09/94	31/08/97	20923
VM0223	Development of broad-specificity antibiotic residue assays using anti-idiotype antibodies	01/09/95	31/08/98	53840
VM0230	Novel immunogen design based on computer modelling for the production of group specific sulphonamide antibodies	08/08/95	07/08/98	88024
VM0232	Study of the metabolism of the endogenous hormones, testosterone, nandrolone & oestradiol in cattle	01/10/95	30/09/98	74917
VM0234	Compound specific isotope analysis (CSIA) as a confirmatory test for endogenous steroid abuse	01/10/95	30/09/98	52339
VM0236	Development and testing of new methods of analysis for drugs in animal feeds	01/11/95	31/10/98	58334
VM0237	Determination of tolerance values applicable to drugs in animal feeds	01/11/96	31/10/99	11251
VM0238	Collaborative studies of methods for drugs in animal feeds	01/06/96	31/05/99	15000
VM0240	Preparation of incurred tissues	01/04/96	31/03/98	61530
VM0241	Evaluation of rapid immunoassay tests for antibiotic residues analysis	01/04/96	30/06/98	57460
VM0245	Pharmacokinetics & residues of natural & synthetic growth promoters in edible & pigmented tissues	01/08/95	31/07/97	68538
VM0251	Analysis of the total sulphonamide in edible tissues	01/04/96	30/09/97	21730
VM0254	Development of selective automated clean-up procedures for acid/neutral drugs	01/04/96	31/03/98	48180
VM0255	Development of automated multi-residue procedures for basic & acidic drugs in milk and eggs	01/04/96	31/03/98	41030
VM0257	Extraction of incurred veterinary residues from animal tissues	01/09/96	31/12/98	82320
VM0258	The effect of storage, distribution, homogeneity and cooking on residues of oxfendazole in food	01/07/96	30/09/97	14000

ANNEX IIIB

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PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
VM0261	Epidemiological study to detect well defined chronic effects in humans of dipping sheep with organophosphorous products	01/11/95	30/04/99	67585
VM0266	Quality assurance preparation of incurred tissue with known drug content	01/01/98	31/03/01	23450
VM0267	Technology transfer	01/06/97	31/03/98	50958
VM0268	The effect of cooking on veterinary drug residues in food	01/12/97	30/11/99	14792
VM0269	Extension and development of multi-residue extraction / clean-up procedure to additional drugs and matrices	01/04/97	31/03/00	58900
VM0271	Use of industry methods as a basis for multi-residue avermectin analysis by bench top LC-MS	01/04/97	31/03/99	67000
VM0273	Testing of developed methods of analysis for veterinary drugs at residue concentrations	01/04/97	31/03/98	29000
VM0274	Yeast based recombinant human steroid receptor assays for the class determination of oestrogens.	01/04/97	31/03/99	69383
VM0275	Development of a single ion mass spectrometric screening procedure for sulphonamides	01/01/98	31/03/99	29560
VM0276	Development of a confirmatory procedure for malachite green and its leuco form in fish tissues by LC-MS	01/04/97	30/09/97	44060
VM0277	Extraction of veterinary drugs and banned substances from complex matrices as required by revised directives	01/04/97	31/03/98	7340
VM0282	Multi-residue analysis of aminoglycoside antibiotics by capillary electrophoresis-mass spectrometry	01/04/98	31/03/00	0
VM0283	Use of industry methods as a basis for multi-residue macro- lide analysis by bench top LC-MS	01/04/98	31/03/00	0
VM0288	Development of methods for the screening and confirmation of cephalosporins in meat and milk	01/04/98	30/09/99	0
VM0289	Evaluation of commercial ELISA kits and development of a multi-residue ELISA screening method for synthetic hormones	01/06/98	31/12/99	0
VM0290	Additional validation of analytical methods	19/01/98	31/03/98	99944
	BSE & RELATED DISEASES			
	DIAGNOSIS			
SE0214	Selective studies of neurological disorders in cattle to aid the clinical differential of diagnosis of BSE	01/04/96	19/08/97	51427
SE1409	Development of an antemortem test for BSE & natural scrapie infection through the detection of abnormal deposits of PrP	01/04/94	31/03/98	261101
SE1411	Further analysis of nucleic acid differences between control & scrapie/BSE infected animals	01/04/94	31/03/98	96511
SE1426	Generation and validation of transgenic mice expressing multiple copies of sheep and bovine PrP gene alleles	01/04/98	31/03/01	0
SE1427	Association of PrP gene non-coding region polymorphisms with incidence of natural scrapie in sheep and PrP expression	01/04/98	31/03/01	0
SE1707	Sensitivity studies of fibril detection techniques used in Electron Microscopy for the diagnosis of scrapie	01/04/91	30/09/97	21381
SE1718	Identification and characterisation of the scrapie agent from a low protein, high infectivity fraction of brain	01/10/95	30/09/99	139188

ANNEX IIIB

CURRENT MAFF RESEARCH PROGRAMMES FOR WHICH REQUIREMENTS ARE NOT INCLUDED IN THE ANIMAL HEALTH RESEARCH REQUIREMENTS DOCUMENT FOR 1999/2000

PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
SE1725	Studies of the enhancement of reproducibility of PrP Scrapie detection after cold storage of scrapie affected tissue	01/04/95	31/03/98	19812
SE1728	Relationship between conformation of PrP, infectivity and pathogenicity of BSE as a basis for diagnosis	01/04/96	31/03/98	26611
SE1729	PrP gene codon 171 and species susceptibility to scrapie like diseases	01/04/96	31/03/99	89339
SE1731	Production of polyclonal antisera to highly purified bovine PrP scrapie	01/04/96	31/03/98	295491
SE1734	Approaches to the identification of nucleic acids associated with the transmissible encephalopathies	16/06/97	15/06/98	65923
SE1735	Evaluation of miniblotting system to detect the abnormal protein (PrPSc) in neural and non neural tissues for the diagnosis of BSE	01/09/96	31/05/99	81666
SE1736	Experimental production of bovine tissues for validation of BSE diagnostic tests	01/04/97	31/03/98	252147
SE1737	Provision of "Pre-clinical BSE" body fluid samples from bovines experimentally challenged with infected brain material	01/11/96	31/03/01	91176
SE1739	Development of an ultra-sensitive, time resolved flouro-immunoassay for PrPSc	01/02/97	31/01/00	74250
SE1740	Subtractive panning of a non-immunised phage display library: a rapid means of producing antibodies diagnostic for the abnormal form of PrP	01/04/97	31/03/99	103836
SE1741	Using the chemistry of blood and urine as an aid to the diagnosis of BSE	01/04/97	31/03/00	111002
SE1743	Further investigations of BSE specific markers, including ApoE, and the search for new markers	01/04/97	31/03/00	141150
SE1744	Molecular analysis of putative genetic factors affecting BSE susceptibility	01/03/98	29/02/00	27902
SE1746	Characterisation and validation of a serum metabolite as a marker for BSE in the live animal: Phase 1	01/09/97	31/12/97	267975
SE1749	Extended provision of bovine body fluids from pre-clinical BSE and control animals	01/10/97	31/03/00	154328
SE1922	Studies of the sensitivity and specificity of methods of PrP scrapie detection in animal TSEs	01/04/95	30/09/98	193884
	EPIDEMIOLOGY			
OC9425	An investigation of scrapie infectivity and PrP genotype in clinically normal cast ewes from infected flocks	01/04/95	31/03/99	58574
SE0209	BSE: Epidemiological studies	01/04/96	31/03/99	295505
SE0212	Comparative neuropathology of recently recorded scrapie-like encephalopathies in animal species other than cattle	01/04/95	31/03/98	67929
SE0213	An epidemiological study of sheep scrapie to determine means of natural transmission	01/04/95	31/03/98	160552
SE0218	The feasibility of using microwave techniques to destroy livestock carcasses	01/12/96	31/05/97	13024
SE0219	The epidemiology of TSEs in ruminants and assessment of possible associated risk to human health	01/01/97	30/04/00	75804
SE0220	The neuropathological monitoring of suspect BSE cases born in 1993	01/07/97	30/06/99	58472
SE0221	Analysis of BSE cohort study data	01/06/97	30/06/97	2500
SE0222	Risk of BSE infectivity in meat for human consumption	01/10/97	30/04/98	
SE0223	The establishment and application of a BSE lesion profiling data base	01/08/97	31/07/98	16357
SE1412	PrP gene variants & their potential as marker for natural and experimental scrapie susceptibility in sheep	01/04/94	31/03/98	82543

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PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
SE1413	Strain-typing of scrapie agent in meat and bone meal	01/01/97	31/12/99	70380
SE1417	The effect of PrP genotype on the thermostability of scrapie agent	01/04/95	31/03/00	108257
SE1421	BSE and scrapie agent susceptibility to laboratory facsimiles of rendering practices	01/04/95	31/03/98	73587
SE1422	Practical aspects of inactivation of BSE and scrapie agents	01/04/95	31/03/97	6473
	PATHOGENESIS			
SE1414	Studies on the "species barrier" in scrapie and BSE	01/04/95	31/03/00	123895
SE1415	Strain typing of BSE pathogen in mice and comparison with strains from natural sheep scrapie	01/04/95	31/03/99	113069
SE1416	Development of mouse models for the study of bovine transmissible spongiform encephalopathy	01/04/96	31/03/99	84400
SE1420	Identification of BSE infection in cattle tissue	01/04/95	31/03/97	8827
SE1428	Pathogenesis studies of experimental BSE in sheep	01/01/97	31/03/00	308040
SE1432	The susceptibility of New Zealand sheep to TSE infection and linkage with PrP genotypes	01/04/98	31/03/01	0
SE1901	Pathogenesis of experimental BSE in cattle	01/04/92	31/03/99	227637
SE1909	Studies of the cellular and humoral responses of distal ileum mucosa and mesenteric lymph nodes in the pathogenesis of BSE	01/04/96	31/03/99	346908
SE1910	The demonstration and immunostaining of small virus-like particles in experimental scrapie rodent brain	01/04/96	31/03/99	48514
SE1912	Investigation into links between oxidative stress and BSE	01/04/96	31/03/99	52539
SE1913	Aetiological studies of brainstem neuronal chromatolysis; a disorder clinically similar to BSE	01/10/92	31/03/98	81507
SE1918	Effect of oral inoculum dose on attack rate and incubation period of BSE in cattle	01/04/95	31/03/99	216987
SE1919	Studies to identify possible homologies between TSEs	01/04/95	31/03/01	28391
SE1920	Ultrastructural, morphological and immunocytochemical studies of TSE	01/04/96	31/03/99	133700
SE1927	Immunohistochemical detection of cellular perturbations in formalin-fixed brain from cattle with neurological disorders indistinct from BSE	01/04/96	17/12/97	2500
SE1929	Studies of experimental BSE in genetically susceptible sheep	01/03/97	31/03/00	288313
SE1930	Further studies of the effect of oral innoculum dose on attack rate and incubation period of BSE in cattle	01/04/97	31/03/01	232308
SE1931	Maintenance of a TSE-free sheep flock after importation from New Zealand	01/04/97	31/03/98	455989
SE1933	BSE agent replication in bovine brain cell lines	01/10/97	30/09/00	5293
SE1934	Pathogenesis of BSE in bovine brain cell lines	01/10/97	30/09/00	21180
SE1935	Identification, selection and importation of TSE-free sheep from New Zealand	01/09/97	19/03/98	659348
SE1936	Studies of graft derived PrP in the brains of PrP0/0 mice	01/04/97	30/06/98	23646
SE1939	An ultrastructural study of brain stem neuroanatomical nuclei in BSE-affected cattle	10/09/97	09/06/98	36611
SE1941	Studies to examine the pathogenicity, phenotype and pathogenesis of endemic scrapie in cattle	01/04/98	31/03/00	0
SE1942	The attack rate and phenotype of scrapie-like disease on transmission to cattle of fresh & rendered pools of scrapie	01/04/97	31/03/98	184195

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PROJECT	TITLE	START DATE	END DATE	EST. COST 97/98 (£)
	TRANSMISSION			
SE1418	BSE transmission in sheep	01/04/95	31/03/97	11181
SE1423	Transmission studies for the detection of BSE in sheep	01/04/96	31/03/01	204000
SE1424	The study of BSE in sheep and the possibility of its vertical transmission	01/12/96	31/03/00	53345
SE1713	Gain information on use of resistant rams as method of controlling or eradicating scrapie	01/04/92	31/03/99	33996
SE1801	BSE: Embryo transfer studies	01/10/89	31/03/01	61877
SE1805	Transmissibility of BSE to domestic fowl by injection with brain homogenate	01/04/92	31/03/98	28137
SE1806	Transmissibility of BSE to domestic fowl by oral exposure to brain homogenate	01/04/92	31/03/98	28235
SE1814	To determine if scrapie can be transmitted by transfer of embryos from ewes infected with scrapie to uninfected ewes	01/10/95	30/09/98	19826
SE1816	Transmissibility of BSE to pigs by injection with brain homogenate	01/04/95	31/03/98	33949
SE1817	Transmissibility of BSE to pigs by oral exposure to brain homogenate	01/04/95	31/03/99	63465
SE1818	Transmissibility of BSE to cattle by oronasal exposure to placentae of affected cattle	01/04/95	31/05/98	33498
SE1819	BSE Embryo transfer studies	01/04/96	31/03/01	608244
SE1821	Comparative efficiencies of the bioassay of BSE infectivity in cattle and mice	01/04/95	31/03/99	270462
SE1822	Transmissibility of scrapie to pigs by oral exposure to brain homogenate	01/04/95	31/03/98	144443
SE1823	Investigation of the role of the embryo in maternal transmission of scrapie in sheep	01/07/95	30/07/01	49987
SE1824	Bioassay of BSE infectivity in non neural tissues by intracerebral inoculation of cattle	30/06/96	31/03/00	615782
SE1825	Bioassay of BSE infectivity in non-neural tissues by intracerebral inoculation of cattle (list B)	01/04/98	31/03/02	0
SE1826	Measures to reduce contamination of meat & environment with CNS tissue during slaughter & processing of cattle & sheep	01/02/98	31/01/01	23883
SE1828	The exposure of British sheep and cattle to mites	01/07/97	30/06/02	155014
SE1829	Replication of scrapie and BSE prions in mites	01/06/97	31/05/01	159966
SE1831	Research into the potential for neural embolism after captive bolt stunning and slaughter in cattle	01/01/98	31/03/98	108127
SE1832	Investigations into the potential for neural embolism at stunning and slaughter in sheep	01/01/98	30/06/98	19258
SE1833	Development and evaluation of a practical method for the removal of spinal cord from sheep carcasses	01/01/98	31/04/98	

Ministry of Agriculture, Fisheries and Food
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